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Voorwoord

Oktober 2007 - In Italië blijken de afgelopen tien jaar 37 militairen te zijn overleden aan kanker na te zijn blootgesteld aan verarmd uranium in Bosnië en Kosovo. Nog eens 218 militairen lijden aan tumoren die op radioactieve straling terug te voeren zijn. Het Italiaanse parlement begint een parlementair onderzoek naar de effecten van verarmd uranium op de menselijke gezondheid. De regering gaat over tot het uitkeren van schadevergoedingen.
Oktober 2007 - Een 26 jarige Nederlandse Bosnië veteraan besluit zijn verhaal naar buiten te brengen. Artsen haalden 45 tumoren uit zijn blaas. In Bosnië heeft hij een terrein bewaakt waar munitie vernietigd werd, waaronder verarmd uranium munitie. De militaire vakbonden roepen militairen op zich te melden als zij vermoeden dat hun medische klachten gerelateerd zouden kunnen zijn aan contact met verarmd uranium.
November 2007 - Honderdtweeëntwintig landen roepen in een resolutie de secretaris-generaal van de Verenigde Naties, Ban Ki-moon, op om alle informatie over de gezondheidseffecten van verarmd uranium te verzamelen en bij de volgende Algemene Vergadering op de agenda te zetten. Slechts zes landen stemmen tegen, waaronder Nederland. Een meerderheid in de Tweede Kamer tekende vergeefs protest aan tegen dit stemgedrag van de Nederlandse delegatie. Na enige aandrang stemde de Tweede Kamer in met mijn voorstel om ons nader te laten informeren over de effecten van verarmd uranium op burgers en militairen. Voor u ligt het verslag van deze hoorzitting en het daarop volgende publieke debat.

Het struisvogeltijdperk zou hiermee definitief voorbij moeten zijn. Er is veel informatie bekend over de effecten van deze munitie, reden genoeg om te twijfelen aan de veiligheid ervan. In ieder geval zou elk land, in afwachting van verder onderzoek, het voorzorgsprincipe moeten hanteren en geen gebruik moeten maken van deze kogels. De Nederlandse regering moet, na de tegenwerking van het VN initiatief, nu het roer om gooien en alle informatie en onderzoeksresultaten die in Nederland bekend zijn delen met de secretaris-generaal van de VN.

Doordat Nederland jarenlang elk vermoeden van een verband tussen verarmd uranium en medische klachten ontkende, is het nog steeds onbekend hoeveel militairen rondlopen met klachten. Verschillende militairen hebben zich al bij defensie en bij de militaire vakbonden gemeld, maar of dat het topje van de ijsberg is, is onbekend.
Ik roep militairen en nabestaanden van militairen die vermoeden dat hun toestand gerelateerd is aan contact met verarmd uranium dan ook op om hun situatie met ons te delen. Waarom zouden we nog langer pikken dat er in Italië overgegaan is tot het uitkeren van schadevergoedingen terwijl in Nederland de effecten gebagatelliseerd worden?

De eerste tekenen zijn goed. In een recent debat in de Kamer gaf de kersverse staatssecretaris van Defensie Jack de Vries al toe dat Nederland het voorzorgsprincipe hanteert en daarom zelf geen verarmd uranium meer gebruikt. Geen enkele Nederlandse bewindspersoon heeft dat ooit toe durven geven.

Krista van Velzen
SP Tweede Kamerlid
Den Haag, april 2008

Inhoud

Verarmd uranium – Herkomst en Toepassingen

Door Ing. Henk van der Keur, Laka Foundation

Waar komt verarmd uranium (DU) vandaan? Hoe wordt dit radioactieve zware metaal toegepast in producten? Op deze vragen zal ik vanavond antwoord geven, waarbij vooral de militaire toepassingen aan de orde komen; hoe het in oorlogen is gebruikt en hoeveel.

Om te beginnen eerst iets over de plaats van DU in de kernketen. Dat is nodig, want in de media verschijnen regelmatig berichten, zoals eergisteren weer in een Nederlandse krant, waarin wordt gemeld dat DU afkomstig is uit een kernreactor. In dat geval zou er sprake zijn van zogenaamde "vuile bommen", die hoogradioactief materiaal bevatten. Gelukkig is dat niet het geval, want ik denk niet dat veel burgers en militairen in (post)conflictgebieden waar DU is gebruikt dat zouden overleven.

Net als andere metalen is uranium afkomstig van mijnbouw, het wordt gewonnen uit uraanertsen. In 1000 kilo erts zit vaak slechts 1 kilo uranium, waarvan ook nog maar de helft echt vrijgemaakt kan worden; dus 500 gram natuurlijk uranium uit 1000 kilo erts. De rest van het erts is radioactief afval. Slechts 0,7% van dat gewonnen natuurlijk uranium is splijtbaar uranium, de rest bestaat uit niet-splijtbaar uranium. Voor gebruik in de meeste kerncentrales moet de hoeveelheid splijtbaar uranium worden verhoogd tot een percentage van 3 (eventueel tot 5) procent. Dat verrijken gebeurt in een verrijkingsfabriek, zoals bijvoorbeeld bij de vestiging van Urenco in Almelo. Het verrijken van uranium vindt plaats met verschillende methodes. Meestal met behulp van gasdiffusie of ultracentrifuges. Vooral centrifuges hebben sterk aan populariteit gewonnen, omdat ze slechts weinig elektriciteit verbruiken en makkelijk zijn te bouwen. Urenco maakt al sinds de jaren zeventig gebruik van deze verrijkingsmethode, waarbij door de centripetale krachten de lichtere uraniumisotoop (splijtbaar) wordt gescheiden van de zwaardere uraniumisotoop (niet-splijtbaar). Bij vrijwel alle verrijkingsmethoden wordt de uitgangsstof 'natuurlijk uranium', het concentraat uit de uraanertsen, gebruikt in de vorm van uraniumhexafluoride ('hex'), een gasvormige verbinding. Het product dat daarbij ontstaat is verrijkt uraniumhexafluoride en het bijproduct is verarmd uraniumhexafluoride (DUF_6). Het verrijkt uranium wordt nadat het is omgezet in een vaste verbinding geschikt gemaakt voor gebruik als brandstof in een kernreactor. DU wordt vooral opgeslagen als uraniumhexafluoride. De VS (zie figuur 1) en Rusland beschikken over uitgestrekte opslagplaatsen vol met cilinders verarmd uraniumhexafluoride (DUF_6).

Figuur 1: opslagplaats DU

Het Russische verrijkingsconcern Tenex heeft met een aantal uraniumverrijkingsbedrijven in West-Europese landen, waaronder Nederland (Urenco, Almelo), al meer dan tien jaar contracten lopen voor de import van cilinders DUF_6 waarvan het leeuwendeel bij haar fabrieken in Siberië worden opgeslagen. Deze vorm van opslag brengt veel risico's met zich mee. De vaten gaan op den duur roesten en moeten voortdurend worden gecontroleerd. Een lekkage kan grote gevolgen hebben, waarbij zich in extreme gevallen tot kilometersver dodelijke dampen kunnen verspreiden. Daarom wordt DU steeds vaker opgeslagen in de vorm van uraniumdioxide, een vaste verbinding, die relatief veiliger is dan het instabiele uraniumhexafluoride.

Chemical form	**Specific activity, nCi/gm**
uranium metal (DU)	400
uranium dioxide (DUO2)	350
uranium oxide (DU3O8)	340
transuranic activity in TRU or GTCC waste1	>100
0.2% uranium ore	42

1 Slight differences between the U.S. EPA's definition of TRU waste and NRC's definition of GTCC (Greater Than Class C) waste as it relates to transuranic radio nuclides are not material to this discussion because DU is comparable to either one.

2 The specific activity shown for 0.2% uranium ore includes all decay products of uranium-238 up to and including radium-226, assuming they are in secular equilibrium with uranium-238. Radon-222 and its decay products are not included in this number. All values in the table are given in round numbers.

Tabel 1

Tabel 1 laat de activiteit van DU-metaal, verschillende vormen van DU-oxiden zien en dat van het uranium in erts. Vaak wordt de straling van DU op een bagatelliserende manier vergeleken met het uranium in erts of het uranium dat van nature overal aanwezig is. Geheel ten onrechte, de radioactiviteit van het geconcentreerde DU is 100 keer hoger per massa-eenheid. In de VS wordt DU opgeslagen onder de term "Class A". In het algemeen wordt deze klasse verstaan als de klasse met het laagradioactief afval, waaronder het afval van uraanertsen. Maar in feite is "Class A" niet altijd laagradioactief afval. DU is weliswaar laagradioactief, maar heeft een veel langere halfwaardetijd (4,5 miljard jaar) dan de meeste afvalstoffen die onder deze klasse vallen. Bovendien wordt DU na duizenden jaren niet minder radioactief, maar juist hoger

radioactief door de vervalproducten van het niet-splijtbare uranium die op de lange termijn ontstaan.

Er zijn geen recente officiële gegevens van voorraden met DU (tabel 2) waarover verschillende staten beschikken bekend. Ze zijn 6 tot 12 jaar oud. Het is duidelijk dat vooral de kernwapenstaten over grote voorraden beschikken. Bij de productie van hoogverrijkt uranium voor kernwapens komt veel meer DU vrij dan bij de productie van laagverrijkt uranium als brandstof voor kerncentrales. Het cijfer bij China is laag. Waarschijnlijk klopt dat cijfer niet. Maar dit zijn de officiële gegevens waarmee we het moeten doen.

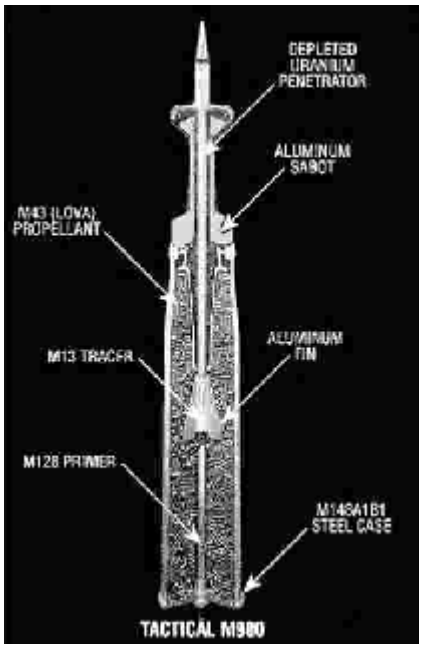
DU (metaal) wordt vooral gebruikt vanwege de hoge dichtheid die het bezit. Het is bijna twee keer zo zwaar als lood. Dat geeft ongeveer aan waar we het over hebben. Het wordt civiel vooral gebruikt als contragewicht of balansgewicht in vliegtuigen. Inmiddels wordt het niet meer in nieuwe vliegtuigen toegepast vanwege onderhoudsproblemen. DU metaal is een zilverwit metaal, maar doordat het makkelijk roest wordt het aan de buitenkant al snel zwart. In ons archief beschikken we ook over documenten waaruit blijkt dat ook gezondheidsrisico's een rol spelen voor de monteurs die deze contragewichten onderhouden of moeten vervangen. Verder wordt DU gebruikt in de kielen van zeilboten of als contragewicht in vorkheftrucks of kranen. Ook wordt het gebruikt in olieboren of in de rotoren van gyroscopen. En je hebt een product als Ducrete, beton vermengd met DU.
Het wordt ook gebruikt in de vorm van platen als bescherming tegen Röntgenstraling in bijvoorbeeld ziekenhuizen, en in de vaatwanden van vaten voor kernsplijtingsafval (hoogactief), afkomstig uit kerncentrales. De hoge dichtheid van DU voorkomt dat neutronenstraling kan lekken.

Country	**Organization**	**DU Stocks (in tonnes)**	**Reported**
United States	DOE	480,000	2002
Russia	FAEA	460,000	1996
France	COGEMA	190,000	2001
United Kingdom	BNFL	30,000	2001
Germany	Urenco	16,000	1999
Japan	JNFL	10,000	2001
China	CNNC	2,000	2000
South Korea	KAERI	200	2002
South Africa	NECSA	73	2001
TOTAL		**1,188,273**	

Tabel 2 bron: WISE Uranium Project

Militair wordt DU toegepast in antitankgranaten van klein tot groot kaliber. De kleinere typen van 20mm, 25mm en 30mm worden gebruikt door gevechtsvoertuigen en vliegtuigen. De grotere typen van 105mm, 120mm en 125mm munitie worden gebruikt door tanks. Verder wordt DU in de vorm van platen metaal gemonteerd in de bepantsering van pantservoertuigen en tanks. De Amerikaanse M1 en de M1A1 (en M1A2) Abrams tanks, en de Britse Challenger tank schoten tijdens de Golfoorlog van 1991 en de Irak-oorlog van 2003 met 105mm (M1 tank) en 120mm munitie. Ook bijvoorbeeld Franse, Russische en Chinese tanks kunnen schieten met uraniumhoudende munitie.

Figuur 2: een M1A1 tank in Irak



Een dwarsdoorsnede (figuur 3) laat ziet hoe de antitankgranaat in elkaar zit. In het midden zit het feitelijke projectiel, een soort van grote dartpijl, in vakjargon ook wel *Kinetic Energy Penetrator* genaamd. Daaromheen zit het omhulsel, dat het projectiel aan de bovenkant omsluit met een zogenaamde *sabot*. Onderin zit de *propellant* dat na ontsteking gasvormig wordt en zorgt voor de aandrijving. De kracht waarmee het projectiel wordt afgeschoten en de hoge massa ervan geven het projectiel een ongekend hoge snelheid. Het projectiel doorboort vijandelijk pantser met groot gemak doordat de enorme massa zich met hoge snelheid richt op een klein punt van het pantser.

Figuur 3: doorsnede 120mm projectiel

De Bradley Fighting Vehicle schoot in beide oorlogen met 25mm antitankgranaten van DU. Het Amerikaanse Marine Corps beschikt over de LAV-25, een gevechtsvoertuig dat ook met 25mm uraniumhoudende munitie schiet, en het gevechtstoestel Harrier AV-8B dat met 20mm munitie schiet. Zowel de LAV-25 als de Harrier AV-8B waren tijdens de oorlog van 2003 actief toen het Amerikaanse Leger vanuit het zuiden naar het noorden opstoomden.
Van alle voertuigen en vliegtuigen heeft het A-10 grondaanvalstoestel veruit de meeste DU afgeschoten. Alle uraniumhoudende antitankgranaten die in de Balkanoorlogen zijn afgeschoten zijn afkomstig van dit toestel. Ook alle DU-munitie die tijdens de Golfoorlogen van 1991 en 2003 is afgeschoten komt voor 95% voor rekening van de A-10.

Nadat een antitankgranaat doel treft ontwijken er stofwolken met zeer fijne uraniumdeeltjes. Volgens het Amerikaanse Leger raakt in een straal van 50 meter rondom het inslagpunt radioactief besmet. Maar daar hebben de burgers natuurlijk geen benul van. Na de gevechtshandelingen kunnen zij zonder dat ze het in de gaten hebben de giftige en radioactieve deeltjes inademen.
DU-munitie is ontwikkeld voor het schieten op gepantserde doelen, maar bij de Kosovo-oorlog (1999) en de Irak-oorlog in 2003 werd duidelijk dat er ook op gebouwen werd geschoten. Zoals in Bagdad bij een aanval op het ministerie van Binnenlandse Zaken. Alles daaromheen raakte besmet met uraniumstof.

Figuur 4: 30mm DU-munitie wordt geladen in het boordkanon van de A-10

Het Pentagon bevestigt dat in Bosnië tussen 1994 en 1995 in totaal bijna drie ton DU-munitie is afgevuurd, vooral rond de stad Sarajevo. In Kosovo werd in 1999 rond de negen ton aan DU-munitie afgevuurd onder NAVO-commando, vooral nabij een snelweg in het zuiden. Maar ook in Servië, in het zuiden, is DU gevonden. Een deel daarvan is door de Servische regering opgeruimd en de besmette bodems gesaneerd. Er zijn geen officiële gegevens bekend over de hoeveelheden DU-munitie die in Servië zijn gebruikt.

Doordat er nog altijd geen goede methodes voor handen om met DU besmette gronden schoon te maken, zijn de saneringskosten zeer hoog. Feitelijk moet men alle besmette grond afvoeren. En dat kost veel geld.

In Kosovo gevonden DU-munitie heeft men sporen aangetroffen van radioactieve stoffen die normaal gesproken niet thuishoren in DU. Dat zijn sporen van opgewerkt uranium dat afkomstig is van opwerkingsfabrieken, zoals die staan in Sellafield of La Hague. Dat wil niet zeggen dat we hier te maken hebben met opgewerkt uranium. Het heeft te maken met verrijkingsfabrieken waar opgewerkt uranium is gebruikt om te verrijken. Dat heeft men bijvoorbeeld hier in Nederland ook wel gedaan bij Urenco, maar dan wel met oudere fabrieken die op de nominatie stonden om te worden gesloopt. In de VS is dat gewoon tijdens regulier bedrijf gebeurd. Die fabrieken zijn daardoor besmet met radioactieve stoffen die zich in het opgewerkte uranium bevonden. Op die manier zijn er in de VS voorraden van DU ontstaan die besmet zijn met radioactieve stoffen die in een reactor zijn geproduceerd. Dat moet de verklaring zijn waarom er in de DU-munitie sporen werden gevonden van plutonium, uranium-236 en transuranen.

In 1997 verklaarde een Pentagonwoordvoerder dat in de Golfoorlog van 1991 286 ton, later werd dat gecorrigeerd naar, 315 ton DU is gebruikt. In die oorlog is het vooral gebuikt in het zuiden van Irak tijdens tankveldslagen. Niet zover van As Sammawah waar Nederlandse troepen zaten in 2003/2004. Dat zit dus in de rand van het gebied waar het in 1991 heel veel gebruikt is. Maar er zijn ook besmette plekken uit de 2003-oorlog in het gebied. Het is bekend dat de Amerikaanse militairen in het oude Camp Smitty zich in een loods, nabij een

rangeerterrein, bevonden die ook was geraakt door DU-munitie. De Nederlandse troepen bouwden een nieuwe Camp Smitty.

Branch	*Weapon System*	*Ammo Size*	*Quantity of DU Rounds*	*Weight of DU (kg)*
US Army	M1 tank	105mm	504	1,930
	M1A1 tank	120mm	9,048	37,293
US Air Force	A-10 jet	30mm	782,514	236,319
	A-16 jet	30mm	1,000	302
US Marine	AV-8B Harrier	25mm	67436	9,981
Corps	M60A3	105mm	unknown	unknown
	M1A1	120mm	unknown	unknown
US Navy	Phalanx Gun	20mm	unknown	unknown
UK Navy	Challenger tank	120mm	88	408
Totals			Tanks 9,640	Tanks 39,631
			Jets 850,950	Jets 246,602
				Total 286,233

Tabel 3 (samengesteld door Dan Fahey)

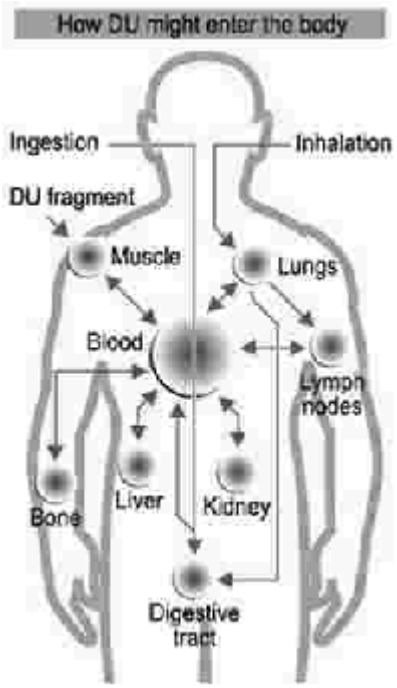
DU wordt niet alleen gebruikt tijdens oorlogen, maar wordt ook gebruikt op test- en trainingsterreinen. Sinds midden jaren negentig mag DU in de VS niet meer worden gebruikt op dit soort terreinen. De kosten voor schoonmaak zijn te hoog en daarom gebeurt het sindsdien indoor.
De Jefferson Proving Ground in het zuidoosten van de Amerikaanse staat Indiana was een heel groot testterrein dat van 1943 tot midden jaren negentig is gebruikt. Een klein deel daarvan, ongeveer 200 ha is gebruikt voor het testen van DU. Tussen 1983 en 1994 is er met zo'n 100 ton DU geschoten. De schattingen die het rapport geeft over de schoonmaakkosten zijn astronomisch: tussen de 45 miljoen en 1,2 miljard dollar. En het verwijderen van die grond kost ook nog weer 1,3 miljard dollar. Dat geeft een indicatie waarover we het hebben. [bron: "Decommissioning Plan for License Sub-1435 - Jefferson Proving Ground [JPG], Madison, Indiana. Submitted by the U.S. Army's Soldier and Biological and Chemical Command to the Nuclear Regulatory Commission (NRC), June, 2002].

Hieronder staat een aantal limietwaarden vermeld die aangeven wat de maximaal toegestane hoeveelheid is van uraniumstof dat je binnen mag krijgen.

US Nuclear Regulatory Commission	**inhaling 10 mg can cause health problems**
The United Kingdom	8 mg is harmful for workers in the nuclear industry more than 2 mg is unacceptable for the general public
The WHO estimates	daily intake of 0.6 microgram per kilogram body weight (daily limit of 40 microgram for a person of 68 kg)
For comparison: one 120mm DU antitank shell after impact on a hard target can disperse 950 gram of DU oxides and a 30mm one of an A-10 aircraft 96 gram	

Tabel 4: Limietwaarden

Tot slot een schematisch overzicht over de routes van DU(oxiden) in het lichaam. Feitelijk is dit schema al weer achterhaald. Met name de afgelopen 8 jaar is veel onderzoek gedaan naar DU. Daaruit is onder meer naar voren gekomen dat ook de hersenen een doelorgaan zijn van DU.



Figuur 5: Routes van DU in het lichaam

International Law and Depleted Uranium Weapons: A Precautionary Approach

By Avril McDonald, she is an expert on International Humanitarian Law/International Criminal Law, and the co-writer of *International Law and Depleted Uranium Weapons: A Precautionary Approach*, edited by Avril McDonald, Jann K. Kleffner and Brigit Toebes (The Hague, TMC Asser Press 2008).

To begin with, I have no particular interest in DU at all despite that I devoted the last 5 years doing study of it. I was asked by an organisation called IALANA (international association of lawyers against nuclear arms) if I would lead a consultancy about the legality of Depleted Uranium (DU). Before that I had never heard of depleted uranium. The first thing that struck me was the remarkable allegations that were being made including the fact that babies with two heads were being born and other people saying you could put it between two slices of bread and eat it, so save it was. We were fascinated by it and decided to carry out a larger detailed study to look at the legality of the use of depleted uranium. We had no particular interest in the outcome of this study, it was purely objective. According to some people DU was already banned under international law so they wondered 'hey why taking the trouble to study this'. I want to give you the legal framework because so much about DU has been said that is no sensible.

The first question is the Lawfulness of DU weapons. If DU is subject to a ban I can tell you that in two minutes and we can have our coffee break. If not we will have to look at it a little bit closer.

The applicable legal framework on this issue consists of:

- *Primary Rules*
    - Arms control/disarmament law
    - The law of armed conflict/international humanitarian law
    - Human rights law
- *Secondary Rules*
    - The law of state responsibility
    - The law of personal/individual remedies

The Law of Arms Control addresses two groups of weapons:
- Weapons of mass destruction (chemical, biological and nuclear)
- Conventional weapons (all other anti-materiel and anti-personnel weapons)
The Law of Arms Control you have it in treaties and customary (unwritten) form. But there are only a few arms control treaties.

No Discrete Ban on DU by Treaty

Depleted uranium is however not the subject of a specific treaty banning it or restricting its use. Chemical and biological weapons are both prohibited by treaty but DU does not have the properties of such weapons as described in those treaties.

DU is not a Biological or Toxin Weapon

DU weapons do not fit the definition of biological weapons as laid down in the BWC, since this Convention is concerned with 'microbial or other biological agents or toxins'.

- Although the treaty does not define 'agents', this term usually refers to living organisms or infective material (or their synthetic equivalent) obtained from them, that multiply inside the person, animal or plant attacked.
- Toxins – not defined by the BWC but covered by it when used for hostile purposes – whether of a microbial, animal or vegetable nature, including their synthetically produced analogues, are substances that act like chemical agents but ordinarily are produced by biological or microbial processes.

DU is not a Chemical Weapon

DU is not a chemical weapon within the meaning of the Chemical Weapons Convention.
DU weapons are not munitions or devices specifically designed to cause death or other harm through the toxic properties of toxic chemicals and their precursors, as required by the CWC.

As for the 1925 Gas Protocol, DU would not be covered by its ban on asphyxiating, poisonous or other gases, and all analogous liquids, materials and devices, as it is not a weapon that it designed with the intention of poisoning as a means of combat: its poisonous effects are a side-effect of its combat use.

The Law of armed conflict in fact is very technical. When we think of a poisonous weapon we think of a weapon that poisons. But that is not what a poisonous weapon is in the law of armed conflict. Weapons have certain properties. So we know that DU is a chemical and toxic substance but that doesn't make it a chemical or biological weapon. You have to bare that in mind.

DU is not a Nuclear Weapon

- Nuclear weapons are not addressed by a treaty, so we don't precisely know what they are, and in its Advisory Opinion on the Threat or Use of Nuclear Weapons the International Court of Justice could not exclude cases where the use of nuclear weapons might be lawful, although their use would be subject to the law of armed conflict (LOAC)
- Given that there is no prohibition of nuclear weapons per se, it would be particularly difficult to consider DU as a nuclear weapon on account of its radioactive properties

What is a Nuclear Weapon? Two Definitions:

- Protocol III to the Modified Brussels Treaty of 1954 defines a nuclear weapon as a weapon which, by explosion or other uncontrolled nuclear transformation of nuclear fuel or by radioactivity of nuclear fuel or radioactive isotopes, capable of mass destruction, mass injury or mass poisoning.
- Art. I(c) of the Treaty on the Southeast Asia Nuclear Weapon Free Zone defines a nuclear weapon as any explosive device capable of releasing nuclear energy in an uncontrolled manner, not including the means, transport or delivery of such device if separable from and not an indivisible part there of \DU weapons are not used with the purpose of killing by radiation, and are lower in the violence spectrum than a nuclear weapon.

They do not produce radiation as a result of an explosion but as a result of the DU-tipped sabot penetrating a hard object. So in fact DU is not a weapon of mass destruction.

DU is a Conventional Weapon
But it is not addressed by any of the existing treaties regulating particular Conventional Weapons. The only weapon that DU could possibly fall under is that of an incendiary weapon, because it causes fires. But that's not enough to make it an incendiary weapon.

DU is not an Incendiary Weapon
DU cannot be described as an incendiary weapon within the meaning of Protocol III to the 1981 Certain Conventional Weapons Convention.

- *Article 1(1)(b)(ii) of Protocol III states that incendiary weapons do not include munitions designed to combine penetration, blast or fragmentation effects with an additional incendiary effect, such as armour-piercing projectiles, fragmentation shells, explosive bombs and similar combined-effects munitions in which the incendiary effect is not specifically designed to cause burn injuries to persons, but to be used against military objectives, such as armoured vehicles, aircraft and installations or facilities.*
    - International regulations concerning the transfer of and trade in fissile material, such as the International Atomic Energy Agency's safeguards system, apply to DU
    - Although the transfer of and trade in DU weapons are not prohibited by international law, they are subject to export controls and licenses
- *But these types of restrictions aim at controlling the trade in and transfer of DU for security reasons (non-proliferation), considering that it is a dual-use material which could be converted into a nuclear weapon, rather than at restricting the use of the weapon during a situation of armed conflict*

So we can conclude that DU is not specifically a Subject of the Arms Control Law
This means that there is no international prohibition on its use per se
However, when used during an armed conflict, its use, like that of any weapon, is subject to compliance with the law of armed conflict

The Law of Armed Conflict, what are the Relevant Rules?

- Military necessity
- The prohibition on causing superfluous and unnecessary suffering to combatants
- The principle of distinction
- The principle of precaution
- The prohibition on the use of poison or poisoned weapons
- The law protecting the natural environment during armed conflict

On the one hand the Law of Armed Conflict is used for justification of the use of depleted uranium, but on the other hand it also provides important restrictions.
Let us look at the rules in detail.

Military Necessity

- User states claim that DU use is in conformity with the law of armed conflict and is justified legally on the grounds of military necessity

- Its superior penetrating capability (to the alternatives, especially tungsten) gives user states a military advantage which they need. In other words it gives you a bigger advantage then another weapon. Also DU is cheaper compared to its alternatives.
- Military necessity however is not a fixed quantity; it changes according to circumstances . It's in fact a sliding scale. Every single time in battle that determination has to be made: is it's use really necessary in that particular case?
- It only applies to measures that are otherwise lawful according to the laws of war
- It cannot justify the use of weapons that are prohibited by treaty
- It should be applied in each circumstance of a weapon's use
- It applies to measures helping friendly forces as well as those directed against the enemy

The necessity for DU's use at the time it was legally approved was the military advantage it would give the USA, in 1976, against Soviet tanks on the plains of Europe. It was however not envisioned that DU would be used in large quantities in urban areas such as downtown Baghdad, where levels of radiation 1,400 times higher than normal were detected in public places. This is a total different situation where DU is not a necessity. While military necessity provides the justification for DU use, it can equally be seen exerting a possible restraining effect. The military necessity of the use of DU has in general changed since DU was legally approved by the US Army and Air Force. The alternative tungsten is now 'almost as good'. Much more is known about the harmful effects of DU.

So we have to keep in mind that:

- There is no military necessity for its use against personnel where an alternative is available, e.g., ground-launched rather than aerial weapons
- The necessity of DU's use might be different depending on the circumstances of its use: it might be necessary to use it to engage superior armour in an isolated area; but the necessity of its use against a soft target in a town centre is harder to justify, except when striking targets of opportunity
- The advantage of using DU in the particular circumstances must be direct, concrete and real

Superfluous Injury and Unnecessary Suffering

This rule applies only vis-à-vis (enemy) combatants (not friendly forces or civilians). Also keep in mind that you cannot impose a ban on all circumstances of a weapon's use except in cases where the weapon has been designed to cause superfluous injury or unnecessary suffering. The principle prohibits the use of weapons of a nature to cause (that have the effect of causing) superfluous injury or unnecessary suffering to enemy combatants (so it is not applicable to troops injured through DU exposure in friendly fire incidents).

It is codified in the St. Petersburg Declaration, the Hague Regulations and Additional Protocol I to the Geneva Convention (Art. 35(2)). What is considered as superfluous injury and unnecessary suffering is both fixed and relative. There is a minimum threshold of injury or suffering that could potentially be considered as superfluous and unnecessary: it is force used that exceeds the threshold of what is necessary to disable the greatest number of men (materiel). For example, if a weapon needlessly aggravates the suffering of men who will anyway be killed or renders their death inevitable where it is not necessary to kill them, it would reach this threshold. And even then, whether this injury or suffering is considered as superfluous injury or unnecessary suffering will depend on the military necessity of the weapon's use. If it provided a military advantage not otherwise available the suffering and

injury would be justified because it would be necessary and not superfluous. It is debatable whether it applies only to anti-personnel weapons or also anti-materiel weapons. DU is mainly used as an anti-materiel weapon, against tanks. But it's difficult to distinguish between the anti-personnel and anti-materiel effects of the use of an anti-materiel weapon against materiel.

If the principle is applied to DU weapons used against both materiel and personnel, the questions are:

- Does the suffering and injury caused to combatants reach the required threshold? In that case, is it necessary and not superfluous?
- Does the suffering and injury reach the necessary threshold? Arguably yes. If so, against personnel directly, DU use is arguably not necessary because there are viable alternatives.

DU use against materiel could only be justified if there was no alternative providing an equal or greater military advantage in the circumstances of its use.

Prohibition on Poison

There's no definition of poison in LOAC but some argue that the ban covers only weapons that are used with the intention of poisoning – i.e., designed to kill by poisoning (premeditated approach). The ICJ defined it as a weapon whose prime or even exclusive effect is to poison or asphyxiate (effects-based approach). Even if an effects-based rather than a premeditation approach is applied, it is very difficult to consider DU as a poison weapon. Whichever approach is adopted, it does not seem that the use of DU weapons violates the prohibition on poison per se. They are not designed to cause death or damage to combatants by means of poisoning them. And current level of scientific knowledge is such that it is not possible to show that the toxic properties of DU residues cause death or serious damage to health in the ordinary course of events -- a generally agreed requirement for weapon to be considered as poisonous (ICC Elements of crimes).

Distinction

As far as the principle of distinction/prohibition against indiscriminate attacks is concerned, DU use could potentially violate only one provision of Article 51 of Additional Protocol I, namely, paragraph 4(c), which prohibits using methods or means of combat which cannot be limited as required by the Protocol.

As for the other provisions, either the use of DU weaponry does not raise specific issues in relation to them, or it could not be considered to violate them.

DU weapons are not inherently indiscriminate, and therefore 'whether and to what extent the use of DU ammunition violates the prohibition of indiscriminate attacks under Article 51(4)(c) and the corresponding rule of customary international humanitarian law will have to be determined on a case-by-case basis'.

The fact that the effects of DU may be removed in time and space from its initial use may make it difficult to prove that they were caused by it; however, if such a link could be established, effects which are remote in time and space are not excluded by Article 51(4)(c) Additional Protocol I.

The use of DU could also potentially violate the principle of proportionality in particular cases, where the incidental loss of civilian life, injury to civilians or damage to civilian property is excessive in relation to the military advantage anticipated from its use. This assessment will have to be made on a case-by-case basis.

The use of DU in urban areas could have more adverse effects than its use in an isolated rural area. DU use could only be considered to violate the prohibition to render useless objects indispensable to the survival of the civilian population if carried out with that purpose.

Precaution

During all military operations, parties to armed conflicts are required to ensure that precautions are taken. Two articles:

- In planning and conducting military operations (Art. 57 Additional Protocol I)
- In the conduct of military operations to protect civilians against the effects of hostilities (Art. 58 Additional Protocol I)

Of particular relevance in the context of DU is Article 57(2)(a)(ii).
It requires military commanders to take all feasible precautions in the choice of means and methods of attack with a view to avoiding, and in any event minimizing, incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof which would be excessive in relation to the concrete and direct military advantage anticipated.
Along with Article 51(4)(c), Additional Protocol I, it could provide a legal basis for restricting targeting using DU.
Art. 58 (c) Additional Protocol I enjoins parties to an armed conflict, to the extent feasible, to take the necessary precautions to protect the civilian population, individual civilians and civilian objects under their control against the dangers resulting from military operations.
It could provide a legal basis for requiring states to take certain measures aimed remediation in the aftermath of the user of DU to reduce the dangers to civilians

Protection of the Environment

Damage to the natural environment through the use of DU weaponry is foreseeable to a certain extent. However, it is unlikely that such damage will pass the high threshold – widespread, long-term and severe – of Articles 35(3) and 55 of Additional Protocol I.
It is unlikely that the use of depleted uranium would violate the customary prohibition to cause wanton or excessive collateral damage to the environment.

Conclusions on the Law

DU use could potentially violate only the prohibition in Article 51(4)(c) Additional Protocol I and the prohibition of causing superfluous injury and unnecessary suffering to combatants, and even then only in certain circumstances of their use.

The Way Forward

- There is cause for concern regarding DU's potential to cause harm
- However, the full picture about DU's effects has yet to emerge
- In the absence of a ban on DU being adopted, what is needed is an approach that will minimise foreseeable damage and limit any possible ill effects which are not yet foreseeable but possible

A Precautionary Approach

As applied to DU weapons, a precautionary approach necessarily implies precaution in their use during the conduct of hostilities but it is much broader and emphasises precaution, and therefore risk minimisation, at various stages in the life of the weapon, as well as prescribing action for dealing with the aftermath of their use and reducing their proliferation

The Precautionary Approach has Four Facets:

1. Legal reviews of DU munitions by states
2. Precaution in targeting: restricting the deployment of DU weapons in civilian areas
3. Precautions in the aftermath of DU use:
    - Remedial and risk reduction measures
    - Testing of exposed individuals and populations and the conduct of further medical and scientific research by military and civilian bodies
4. The voluntary adherence by user states to a moratorium on the use of DU munitions until possible negative impacts can be dispelled or proven.

The Legal Basis of the Precautionary Approach

- Not the precautionary principle in environmental law
- Not, as a general legal basis for all measures, the principle of precaution in LOAC
- Different measures have different legal bases -- some based in LOAC (principles of distinction, precaution, prohibition of causing superfluous injury and unnecessary suffering military necessity), some in human rights law (right to health, right to information, right to life, right to food, right to an environment, etc.) -- and some are just based on common sense in order to minimise risk for both user states and persons affected by the use of DU.

Is Depleted Uranium a Carcinogen?

By Prof. Dr. Keith Baverstock

Thank you very much for the invitation to come and speak to you tonight. The question is: is depleted uranium a poison? Carcinogens are a kind of poison and it is quite interesting to know that the only carcinogen that you can legally sell across the counter in the United States is tobacco. In Europe quite a few people breathe radon and of course if you live in a house that happens to be affected by radon there's nothing you can do about that. If you happen to be a supplier of water, and that water contains a low level of radon, which is quite often the case because it comes out of the ground where it is uranium there in rock, then you have difficulty because you're selling a carcinogen because you are charging for the water. So that's quite trivial, compared with many other carcinogens that are around. The question that I want to address is can we say that uranium is a carcinogen? I don't draw a very great distinction between depleted uranium and uranium – both of them are chemical toxins. Though natural uranium is a little bit more radioactive than depleted uranium, because uranium 235 has a higher specific activity, it is a little bit more radioactive. But relatively compared for example to plutonium, all uranium isotopes have relatively a low specific activity. So, we accept that there is a risk from the radioactive action of depleted uranium but what the authorities would say is that as these things go it is a pretty small risk and that I suppose one has to admit is true. Certainly I would prefer to have to inhale some uranium isotopes rather than plutonium.

What we really want to do is what we call a risk assessment. The first question we ask is: is there environmental contamination? Some people say there is some cancer and there must be radiation. We say there is radiation or there is chemical toxin or there is depleted uranium and therefore there might be cancer. And we have to acknowledge that where the uranium munitions are used, particularly in dry and arid countries where dust tends to stay around in the environment, there is contamination of the soil and the general environment with this depleted uranium dust. I should say at this point that this is new, relatively new. We are quite used to people being exposed to insoluble uranium oxide particles in uranium mining and in the processing of nuclear fuels. But these oxides are different. They come from the high temperature burning of the uranium and they are a mixture of two oxides, one of which is soluble, its rather slowly soluble, but it is soluble. So, if you took some insoluble uranium oxide and you inhaled it into the lung, it would stay there. It would stay there probably for the rest of your lives or it would be transported to the lymph nodes, the thoracic lymph nodes, and it would still stay in your body. It wouldn't enter the blood, it would stay in the lung or the lymph nodes as an insoluble material. Now there is a radioactive risk from that, as I said, it is a relatively small one. But when the material gets actually into the bloodstream it has the effect of being spread around the body by going, it goes to the bone, the bone marrow, the kidney, the liver. It generally contaminates the whole body and there, I think, is where the problem arises. It is certainly in that connection that I am asking the question, is there a carcinogenic risk.

The second question we ask is: has the contamination led to exposure? I will review the information that we have on that. If it doesn't get into the body it doesn't damage people. Then we do not need to be so concerned about it. If there has been exposure, and by that I mean systemic exposure: has that led to detection of cancer in exposed human population? That is

the first question, that is the gold standard. If you can find epidemiological evidence in humans, then that is pretty clear that it is a carcinogen. If you have not got that evidence than the next level of evidence that you fall back to is: does it lead to cancer in animals? For that you have to have relatively long-term animal experiments. Animals that are kept to the end of their lives, after having being exposed. So maybe three or four years with mice or rats. And the next level of evidence below that is: is it genotoxic? In cells in culture, maybe human cells: can you get changes to those cells caused by the depleted uranium? I am going to review those separate sources of evidence and see what the current situation is.
In the case of uranium: yes, we have environmental contamination and troops serving in Iraq from the UK were measured for depleted uranium in their urine, 440 out of them. No excess levels of depleted uranium were found. That is not all of them, at least not all of those that claim to be exposed to depleted uranium, that is 440 who volunteered to be measured. The same is true of German troops that served in the Balkans. However, very recent measurements at a munitions facility, manufacturing depleted uranium munitions twenty years ago, it closed twenty years ago. Recent measurements on workers from there and people who lived in the surrounding areas in New York State has shown quite elevated levels of depleted uranium in some of them. So, we do know that if you are exposed to it, particularly long-term, you are likely to pick up the depleted uranium. In this factory the contamination came from burning the scraps of uranium which were left over in the manufacture. It was really meant to a furnace and they failed to filter the output of that furnace. They contaminated a large area with this depleted uranium dust which is very much the same as is produced by these weapons. Apart from the evidence from dr. Al-Ali, who unfortunately cannot be here tonight, we do not have any studies, any sufficiently large studies, of people exposed to depleted uranium and with known levels of depleted uranium. We do not have this epidemiological evidence, and not having evidence is not evidence of there being no effect. Although some people would try and tell you that. What we do have is 27 veterans with increased depleted uranium in their urine. They have depleted uranium fragments in their bodies and they cannot take that away so they having to study the effects of depleted uranium. The American Military is having to study the effects of depleted uranium in order to find out what the risk is to those people. Information on that will be discussed below.
We don't have many long-term experiments; in fact, very few long-term experiments on uranium on animals but we do have a few studies and I'll come to those again in detail. But where we have the evidence is several peer reviewed published reports on genotoxic effects of uranium in laboratory systems. Let's just have a quick look at this evidence of exposure. German service personnel in the Balkans and the UK personnel, whether been measured, do not show excess depleted uranium. There are many American soldiers, veterans who have not been measured. But we have the workers at the munitions factory and they were exposed over several years to this dust which was coming from the burning of uranium waste and essentially is an exposure to exactly the same kind of situation as you get after the use of the weapons. And this is detectable twenty years after exposure and one person had inhaled, probably over several years, approximately one gram of this material which is a great deal. We could find out more if we could get the results from the Iraq tooth study. These are the teeth that children naturally shed and they have been collected from two regions of Iraq, one contaminated and the other not. Now because uranium tends to find the bone when it gets into the body, teeth are a pretty good indicator, and you do not have to do any damage to the patient to do it. This would be quite conclusive. If these teeth show evidence of depleted uranium then I think that would be very sound evidence of exposure. It is only the money which is preventing this being done and quite frankly for those who use depleted uranium the costs of doing the study is

actually peanuts. The American Military, the UK Military or any NATO country could afford to do that study without noticing.
As I said, the human epidemiological evidence, an epidemiological study has been carried out on UK servicemen serving in the 1991 Iraq War, not specifically with depleted uranium in mind but with the so-called Gulf War Syndrome. There are only 2092 people in that survey who claimed to have been exposed to depleted uranium and amongst them there were seven cancers and that was not very different from what would have been expected in the number of cancers from the whole population on average. So, there is no evidence there. Frankly 2000 people is really not enough. The population in Iraq would be much more useful for that. But we do have these 27 veterans, and this is a quotation from a paper: "continued evidence of a weak genotoxic effect, the ongoing DU exposure as measured at the HPRT", that is a gene, which can be measured for its mutational frequencies, just one that is convenient to measure and also other chromosomal damage has been detected in this population. And it seems to be at least the chromosomal aberrations seem to be more or less confined to those with the highest levels of exposure. Early on experiments were done with inhaled uranium or dust, that is insoluble, and it produced malignant cancers of the lung and that was to be expected from the radioactivity. Soft tissue sarcomas have been observed around embedded pieces of DU in rats, but this might be a response to having something in the tissue, so an irritant response rather than a chemical response or a radiation induced response.
The most convincing experiment has been done by Alexandra Miller. She works for the Pentagon, at their laboratories, which are looking into the effects of depleted uranium because of the veterans who suffered from the friendly fire and have depleted uranium in their bodies. Therefore the US Ministry of Defence has to look at these people. I am sure, it would not wish to have to do it, but because they are US citizens and they are blatantly injured and we do not know what the full implications of that injury are. The question has to be examined. This is a mouse model to detect leukaemia agents, to detect things which produce leukaemia. It is not strictly: give them the depleted uranium and see if they develop leukaemia. You would need a large number of mice to do that kind of experiment. With this kind of experiment, using specific cells which are injected, you can produce the leukaemia. That is the best evidence that we have in animal experiments.
But we have a lot of evidence. We are talking now about some twenty publications in the peer reviewed literature, experimental studies where cells are exposed to depleted uranium. We get things like genomic instability, cell transformation, that is the transformation to a malignant phenotype. We get the induction of damage to DNA, in double strand breaks, in DNA adducts, in oxidated damage. We see changes in gene activation and expression. It is a very characteristic of what happens when a carcinogen acts. And the latest we see changes in the expression of proteins, which is one step closer to the reality of a carcinogenic phenotype. The two mentioned in blue are the ones I mentioned seen actually in human beings. We cannot say that a chromosome aberration or an increased mutational frequency is a disease. But it is an effect which is often associated with a disease. We all in this room have some chromosomal aberrations and it does not mean to say that we are incubating cancer. But equally well, if you are incubating cancer you will have chromosomal aberrations and mutations.
All these have been reported since the publications in 2001, the Royal Society Report 1 & 2 and the WHO Monograph. In many of these studies, and I think this is perhaps the most critical piece of information, in many of these studies nickel was used alongside, as a kind of control. Did nickel do the same thing as depleted uranium? And yes, the answer was it did. But nickel is not radioactive. It is totally non-radioactive, it is a normal stable element. But it is a an established carcinogen (group I) according to the International Agency for Research on Cancer

(IARC). I believe that if depleted uranium was brought to the attention of the IARC and they made a decision, at the very least they would say that it is a group IIA carcinogen. That is probably carcinogenic. That is the next step down from group I. They probably would not be able to say that is was group I because of the lack of human epidemiological evidence. But there is enough in terms of animal evidence and in terms of mechanistic studies to say that it probably is a carcinogen. And I think that would be a very powerful statement if it could be made.
We cannot unequivocally say, because of the lack of the human experience, that it is an established carcinogen but the evidence that it is, is compelling. Because I think that actually this material is acting primarily by its chemical toxicity. It is heavy metal, and many heavy metals are carcinogens. Because we have a chemicals agency in the European Union in Helsinki, which is just about opening up, it would be interesting to ask if they would agree to depleted uranium dust being sold to the public for some purpose like cosmetic or something to do with the food industry. My guess is they would say: no way. And they would say it on the basis of that laboratory evidence. The fact that it is genotoxic is enough, I think to say that it is almost certainly a carcinogen. I think that was probably my last slide.

Question: Why was a part of the WHO report you took part in not published?

I will give the background to that. I first encountered depleted uranium in 1998. When there was an issue in Kosovo, because depleted uranium had been used and if you recall, there was the United Nations government sent there, and I was asked whether there were any hazards to those people, as staff of the United Nations. And I started to look into it, and I gave the advice that basically for the employers of the United Nations they were not likely to be exposed to this depleted uranium that had been used. I started to look into the situation and evidence was starting to emerge of the genotoxicity. The first publication actually came out in 1998, I think. When the WHO decided in Geneva, and I was in the European regional office to prepare a monograph I was invited to be on the editorial board and I tried to persuade the authors of that report to include the genotoxicity in the report. But the manager of the project declined to do that for some reason. When I realized that the material would not go into that report, I wrote an independent paper with two colleagues who do not work for the WHO and submitted that in 2002 to the WHO to be published. I did not get permission for it to be published, perhaps that is the best way to put it. Nobody would say yes, and I had to have permission to do it as a staff member. So that paper did not get published. I think the reasons, and the director general dr. Brundtland has given to various people a number of reasons, but I suspect they were political and I suspect that the WHO, it is all bargaining after all, they had their priorities and they will prepare to let some things go in order to get agreement from certain countries, which I shall not name including the UK. Those are the two countries actually that run the WHO, really, but this was a smaller matter than other things and that they did not really want the embarrassment of having that issue aired. So it did not get published and I have been meaning to update that and the proposal is that the evidence has been coming in steadily, as I said, by 2002 there were two or three publications and by last year there were roughly twenty. So you can see that since 2002 the evidence has really started to come in. Much of that evidence is coming from Alexandra Miller who is working for the Department of Defence, so I think we can believe it.

Uranium Weapons: Why not believe the Pentagon?

By John LaForge, Nukewatch, USA

References for Briefing

Other U.S. government agencies have also issued warnings.

In 1984, the Federal Aviation Administration warned its investigators, "If particles are inhaled or ingested, they can be chemically toxic and cause a significant and long-lasting irradiation of internal tissue." Still in effect today, this 17-year-old advisory bulletin from the F.A.A., puts the lie to industry, Pentagon, UK and NATO denials of health risks associated with DU exposure. (*Avoiding or Minimizing Encounters With Aircraft Equipped With Depleted Uranium Balance Weights During Accident Investigations," F.A.A. Advisory Circular 20-123, by M.C. Beard, December 20, 1984*; <http://www.copvcia.com/du.htm>)
The U.S. Department of Labor's Occupational Safety and Health Administration says DU exposure causes: "Increased risk of lung carcinoma and chemical toxicity to kidney." (*Health Hazards Data, the Materials Safety Data Sheet from the U.S. Department of Labor/OSHA.*)

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Science News
<http://www.sciencedaily.com/releases/2007/10/071024083640.htm >

Contamination from Depleted Uranium found in Urine 20 Years later

Researchers have found traces of DU in urine more than 20 years later, in those cases where exposure to DU aerosol has been unambiguous and in sufficient quantity.

Science Daily (Oct. 24, 2007) -- Inhaled depleted uranium (DU) oxide aerosols are recognized as a distinct human health hazard and DU has been suggested to be responsible in part for illness in both military and civilian populations that may have been exposed.

University of Leicester geologist, Professor Randall R Parrish will be giving this message to the 119th annual meeting of the Geological Society of America at the Colorado Convention Center in Philadelphia on 28 October 2007.

In his talk entitled: 'Depleted uranium (DU): its environmental dispersion and human uptake' he will outline his research findings on a new method of tracing DU.

The issue has been the subject of investigations by the Royal Society (UK), the National Academy of Science (US) and other bodies, but studies of individuals who have been clearly exposed to environmental contamination are lacking.

Professor Parrish commented: "Our objective was to develop a high sensitivity method of EU detection in urine, using MC-ICP mass spectrometry that would be capable of detecting an individual's exposure to DU up to 20 years after the event.

"We developed this method and applied it to individuals, either known or likely to have had a DU aerosol inhalation exposure, and to a large voluntary cohort of 1991 Gulf conflict veterans to assess DU exposure screening reliability and accumulate data on exposure."

Using his method, Professor Parrish and his research team have found traces of DU in urine more than 20 years later, in those cases where exposure to DU aerosol has been unambiguous and in sufficient quantity. This is true even when the U concentration is at the low end of the normal range.

Most such samples would return a negative screening result with other, less sensitive, methods.

Professor Parrish added: "Our method has been used to show that it is capable of resolving legal cases based on a claim of DU exposure. Also it shows that the occurrence of DU in 1991 Gulf Conflict veterans is likely to be uncommon to rare, but if a significant inhalation exposure occurred then it can be detected in urine for decades to come.

"It offers a way to resolve debates about DU and health and provide perspective on the issue. Resolving the potential implications of DU to health in contaminated populations is best done by properly testing exposed cohorts. The cohorts in need of study are those living in DU-contaminated areas of Iraq, or those living in the vicinity of DU munitions factories with large DU contamination footprints."

Adapted from materials provided by University of Leicester.

Researchers have found traces of DU in urine more than 20 years later, in those cases where exposure to DU aerosol has been unambiguous and in sufficient quantity.

NOTES ON DEPLETED URANIUM MUNITIONS

According to the General Accounting Office, the auditing and investigative agency of Congress: "The relationship between radiation dosage and health risks at low levels of exposure is not clearly understood, and compliance with the Nuclear Regulatory Commission limits does not eliminate the risks of future health problems."
— Frank Aukofer, "Pentagon warns troops about uranium," *Milwaukee Journal Sentinel,* Jan. 27, 1993

Jan. 5, 2001:
Reuters reports that UNEP announced it found radioactivity at eight of 11 sites tested in Kosovo that were struck with DU ammunition by NATO.

Reuters says "U.S. attack jets fired some 31,000 rounds of depleted uranium ammunition against Serbian targets during NATO's 1999 campaign to drive the Yugoslav army out of Kosovo. Some 10,000 rounds were also fired in neighboring Bosnia in 1994-5."

The 11 sites were among 112 in Kosovo hit by DU according to a NATO map. The UNEP "considers that the 11 sites tested are representative of all 112 and wants them all cordoned

off," the German daily *TAZ* reported in Berlin. TAZ reported that the eight sites were "considerably contaminated."

Stephane Dujarric, speaking for UNEP, said "Special attention is also being paid to the risks that uranium toxicity might pose to the ground water around sites."

A U.N. report in May 2000 warned that much of Kosovo's water could be so contaminated as to be unfit to drink, and that a clean-up of the province could cost billions of dollars. It warned U.N. staff not to approach any target that might have been hit by a depleted uranium weapon.

Uranium dust as well as unexploded munitions had been discovered, TAZ said in an advance release of a story due for publication on Saturday. TAZ said it had obtained a copy of an interim UNEP report dated December 29, 2000.

— Irwin Arieff, "UN finds radioactivity at NATO bomb sites in Kosovo," *Reuters*, Jan. 5, 2001

Feb. 18, 2001
Pekka Haavisto, head of the UNEP's investigation of DU warned of the necessity to "closely follow the state of health" of those exposed to the ammunition in the Balkans.

Germany, Italy, Norway and the European Parliament have called for a moratorium on using the ammunition. Dr. Davic McClain, the military's depleted uranium researcher, told a presidential committee investigating Gulf War illnesses in 1999 that "strong evidence exists to support [a] detailed study of potential DU carcinogenicity."

A separate Army-funded study conducted by the Lovelace Respiratory Research institute in Albuquerque, New Mexico, found that DU caused cancer when implanted in laboratory animals.

A July 1990 report from the U.S. Army Armament, Munitions and Chemical Command predicted that, "Following combat, the condition of the battlefield and the long-term health risks to natives and combat veterans may become issues in the acceptability of the continued use of DU [ammunition] for military applications." The report added that DU is "linked to cancer when exposures are internal."

In January 1998, the Pentagon's Office of the Special Assistant for Gulf War Illnesses made a long-overdue admission: "Combat troops or those carrying out support functions generally did not know that DU contaminated equipment such as enemy vehicles struck by DU rounds required special handling. The failure to properly disseminate such information to troops at all the levels may have resulted in thousands of unnecessary exposures."

Several of the contaminated veterans "continued to excrete depleted uranium in their semen and urine six years after the war."

— Dan Fahey, "Depleted Uranium: America's Military 'Gift" That Keeps on Giving," *Los Angeles Times*, Feb. 18, 2001

PROF. HARE SHARMA, of the University of Waterloo, Ontario, found high levels of DU in urine of ex-Gulf War servicemen ten years after the exposure.

Dr. Steve Wing, in the journal *New Solutions*, June 2000 ("The Science and Politics of Radiation studies") says interpretation of health data for nuclear workers depends on "an increasingly outdated Emphasis" on studies of A-bomb survivors, although studies over two decades suggest that relying on bomb survivor studies may mean that cancer risks among exposed populations are seriously underestimated."

— Contact Dr. STEVE WING: 919-966-7416.

— *Radioactive Times*, journal of the Low-Level Radiation Campaign, June 2000, Vol. 4, No. 1, p. 6-7

A 1996 survey of U.S. Gulf War veterans in the Mississippi own of McGann showed that of 267 families questioned, 67 percent of children conceived after their fathers returned from the Gulf had rare birth deformities.

"Depleted uranium is a radioactive waste and, as such, should be deposited in a licensed repository," according to a June 1995 statement by the U.S. Army Environmental Policy Institute.

Britain's Atomic Energy Authority (UNAEA) was so alarmed to learn of the UK's 1991 use of DU that it sent a report to the MOD in April 1991 [leaked to the Independent in Nov. 1991], warning of a health and environmental catastrophe. AEA estimated that if 50 tons of DU dust were left over from the impact of DU weapons, there could be in excess of "500,000 potential deaths" from cancer in the region within 10 years.

August 15, 1991 letter to Leonard Dietz from the Office of the Director of Defense Research and Engineering at the Department of Defense in Washington, DC. "You posed the question of the probability that lung cancer could develop after the inhalation of depleted uranium. As you are no doubt well aware, since the material is a source of ionizing radiation, the potential for carcinogenicity is real."

— Felicity Arbuthnot, "The Lie of the millennium?" *Al-Ahram Weekly* On-line, March 15-21, 2001

The Pentagon's Armed Forces Radiobiology Research Institute (AFRRI) in Bethesda, Maryland, has discovered that DU leads to the occurrence of oncogenes, tumorous growths believed to be the precursors to cancerous growth in cells, and that it kills suppressor genes. They also found that embedded DU, unlike most metals, dissolves and is spread through the body, depositing itself in organs like the spleen and the brain; and that a pregnant female rat will pass depleted uranium along to a developing fetus." Dr. David Livengood, chairman of the department of cellular radiobiology at AFRRI, said, "We are particularly surprised at how quickly we found oncogenes."

The Army's AMCCOM (radiological) task group noted that "long term effects of low doses [of D.U.] have been implicated in cancer ... there is no dose so low that the probability of effect is zero."

The U.S. has sold DU weapons to Thailand, Taiwan, Bahrain, Israel, Saudi Arabia, Korea, Turkey and Kuwait. Britain and France have purchased large quantities of raw DU for use in their weapons programs, and the Russians have developed DU munitions of their own.

The UN Sub commission on Prevention of Discrimination and Protection of Minorities passed a resolution[s] that includes language calling for a prohibition on the use of depleted uranium; only the U.S. representative voted against it.

—Bill Mesler, "Pentagon Poison: The Great Radioactive Ammo Cover-up," *The Nation*, May 26, 1997

Dr. ERIK HOSKINS, a public health specialist who surveyed Iraq as a member of a Harvard team, wrote an Op-Ed, "Making the Desert Glow, in *The New York Times*, January 1, 1993, warning that DU may be causing health problems in Iraqi children.

A few weeks later a harsh letter to the editor accused Hiskins of "hyperbole" that reaches the "bizarre conclusion that the environmental aftermath of the Persian Gulf War is not Iraq's fault, but ours!" The writer Russell Seitz, was Id'd only as an associate with the "Olin Institute for Strategic Studies at Harvard. It turns out the Olin Institute was established by the J. M. Olin Foundation, of the Olin Corporation, which in 1993 was the nation's only maker of DU anti-tank rounds.

— Bill Mesler, "The Pentagon's Radioactive Bullet," *The Nation*, Oct. 21, 1996.

"The U.S. military still must protect its troops from radiation. Exposure could occur during the use of radioactive materials in conventional explosives, or nuclear plant accidents where the military would be called in to help. These exposures could increase the risk of leukemia and certain cancers later in life.

"The [NAS's] Institute of Medicine has examined a 1996 directive that NATO issued at the time troops went to Bosnia. The report provides the Army with guidance ... on the health of exposed soldiers.

"Commanders should weigh radiation-related risks against potential risks from alternative actions.

"The DOD should provide training to all soldiers and inform them of actual or suspected radiation exposure, the report says.

"DOD should implement a system to measure internal as well as external radiation doses of all soldiers."

— The National Academy of Sciences, "Radiation Threats in Post-Cold War Era Bring New Strategy of Protecting Troops," May 6, 1999

The DU controversy exploded in Europe early in 2001 after Italy, Belgium, Spain, Portugal and the Netherlands reported a spate of cancer cases among soldiers who took part in peace-keeping operations in Bosnia and Kosovo.

RAI News 24 (Italy) produced evidence showing that Italy possessed DU munitions from 1985 on, and that these weapons were used by Italian peacekeeping forces serving in Somalia in 1992-94 and were even used on some Italian firing ranges up until 2001.

— *Campaign Against Depleted Uranium* (CADU) *News* No. 11, Summer 2002

WHO PRODUCES DU DEVICES?

CAROLINA METALS, INC [CMI] a wholly-owned subsidiary of Nuclear Metals, Inc., is the only commercial conversion facility of uranium hexafluoride (UF6) to DU metal in North America.

The DU metal produced at CMI is used by NMI for processing into a variety of products. NMI is one of only two domestic DU producers...

— Carolina Metals, Inc. Hwy 80, Barnwell, SC 29812 (803) 259-3622

— Nuclear Metals, Inc., 2229 Main St., Concord, MA 01742 (508) 369-4045; <sales@nucmet.com>

"Increased risk of lung carcinoma and chemical toxicity to kidney. Hazardous decomposition products ... Decay products of U-238, U-235, and U-234 are radioactive also."

— "Health Hazards Data," in the Materials Safety Data Sheet, U.S. Department of Labor/OSHA

On July 28, 2000, Iraq's UN ambassador Said Hassan said, "The use of depleted uranium has caused pollution of the environment, soil, water and plant life as is at levels 10 times higher than normal. Repairing that damage ... would cost around 375 billion dollars," he said.

— "Iraq says depleted uranium clean-up will cost $375 billion," *Agence France Presse*, July 28, 2000

August 23, 2001, The WHO will send a team of physicians to Iraq Monday to determine whether DU shells used by U.S. troops have caused an increase in Iraqi cancer rates. The 8-member team hopes to lay the groundwork for the lst major international study since the Gulf War, according to WHO spokesman GREGORY HARTL.

HARTL said the WHO team would seek to establish a national cancer registry to obtain accurate statistics on cancer victims.

— *The Washington Post*, Aug. 24, 2001, p. A20

"D.U. presents a possible hazard [because] it is a heavy metal that can be toxic if ingested or inhaled. [It] becomes a hazard only when burned either by fire or with the heat of impact in a target area"

— Army memo from the Armament, Munitions and Chemical Command, May 24, 1991

November 1994 *Los Angeles Times* report notes that one environmental pediatrician, comparing Gulf War babies with others, found a 30% rate of birth defects among the veterans' children — "probably tenfold of what is in the normal population."

— *Milwaukee Journal*, Nov. 15, 1994, p. A3

By May 1995, about 63,000 veterans of the 1991 Gulf War reported persistent illnesses — of the 690,000 troops who went to the war. [The Hartford Courant, May 29, 1995]

By Dec. 2, 1998, 100,000 of about 750,000 troops who served in the Gulf have complained of some sort of health problems. (St Paul Pioneer, Dec. 3, 1998, p. A11) Debilitating illnesses plague about 100,000 of the 700,000 soldiers who served in the 1991 Persian Gulf War.

— Kathleen Sullivan, "Gulf GIs Exposed to Toxics: Pentagon admits veterans not warned of radioactive metal used in ammunition, The *San Francisco Examiner*, January 9, 1998

Kathleen Sullivan, "New link to Gulf War ills: Bullets of uranium," *San Francisco Examiner*, Aug. 19, 1997 (date in question)

Dr. ROSALIE BERTELL, an epidemiologist [formerly] of Toronto [author of *No Immediate Danger: Prognosis for a Radioactive Earth*, The Women's Press, 1985, along with dozens of scientific articles on DU], said "When shoe shells hit tanks and reached temperatures above 500 degrees Celsius [932 degrees Fahrenheit] depleted uranium became an aerosol, and it was highly breathable and could travel great distances from the source."

— John Donnelly, "Iraqi cancers offer clues to Gulf War Syndrome, Uranium residue a prime suspect," *The Miami Herald*, April 6, 1998

The number of cancer cases and birth defects among Iraqi civilians in the cities of Basra, Amara, Nasiriyeh and Diwaniyeh has grown at least threefold since the 1991 war, according Iraqi doctors and medical records.

From Iraqi Hospital Records, Government Cancer Registries and Battlefield Radiation Tests:

* The number of childhood leukemia patients is double or triple what it was before the 1991 war.
* An Iraqi government study of 1,625 pregnant women nationwide found the odds of miscarriage were 3.2 times greater if the father had been a Gulf War soldier.
* The per capita rate of all cancers in southern areas was 4.6 times higher and the rate of birth defects was 2.8 times greater than elsewhere in the country
* Measurements of radiation taken from destroyed Iraqi tanks in 1995 — 4 yrs after the war — found readings eight times higher than normal background radiation. The tanks had all been hit by DU rounds.

— John Donnelly, "Insight into Gulf War Syndrome? An increase in cancer rates in southern Iraq may offer clues to the mystery illness," *Knight Ridder* Newspapers, March 22, 1998

"But in a 1995 report to Congress, the Army Environmental Policy Institute said depleted uranium has the potential to generate 'significant medical consequences' if it enters the body."

— Kathleen Sullivan, "Gulf War map a clue to vet ills? Pentagon reveals battlefield sites were exposed to depleted uranium ammunition," *San Francisco Examiner*, January 25, 1999

"A soldier inside an army tank armed with uranium bullets will be exposed to as much as 1/10ths of a millirem of gamma radiation every hour, according to Darwin Taras, an Army expert on DU weapons. A FDA radiation authority said that at this millirem dosage tank crews will receive the equivalent of one well-administered chest X-ray every 20 to 30 hours. This dosage is permissible but not desirable ...."

— Joseph Albright, "Pentagon Will Use Depleted Uranium for Making Armor Piercing Bullets," *Atlanta Journal Constitution*, March 12, 1978

On Nov. 17, 1997, at the National Press Club in Washington, the Military Toxics Project released Army training videos which have been withheld from military personnel regarding the health and environmental dangers associated with depleted uranium weaponry.

The training videos, completed in 1995 by the Army's Depleted Uranium Project, were obtained from an Army officer who is concerned that active duty soldiers are still not receiving proper training about the use and dangers of depleted uranium munitions. The training videos highlight the dangers of depleted uranium and the need for strict safety measures when coming into contact with contaminated vehicles and personnel injured by uranium fragments.

— *Military and the Environment*, Dec. 1997, p. 3

REPORTED SYMPTOMS OF GULF WAR SYNDROME

The U.S. Army Mobility Equipment, Research & Development Command, March 7, 1979, states:

"Not only the people in the immediate vicinity (emergency and fire fighting personnel) but also people at distances downwind from the fire are faced with potential over exposure to airborne uranium dust."

"Wind-blown particles readily lodge in lung tissue, exposing the host to a growing, toxic dose of alpha radiation and capable of inducing cancer and other deadly illnesses. A single, microscopic particle of DU lodged in the respiratory system is the radiological equivalent of fifty (50) X-rays, and can subject lung tissue to 8,000 times the annual radiation dose permitted by federal regulations for whole-body exposure," said Laura Olah, a board member of the Military Toxics Project, U.S.

April 2, 1993, *MLWK JRNL*, Associated Press:
skin rashes, loss of hair, bleeding gums, elevated blood pressure and liver disorders

Jan. 9, 1994, *MLWK JRNL*, Associated Press:
muscle pain, memory loss, birth defects, respiratory problems and certain cancers

Apr. 30, 1994, Minneapolis *Star Tribune,* via *Newsday*:
fatigue, skin rash, muscle and joint pain, headache, loss of memory, shortness of breath, gastrointestinal problems

"The [NIH] panel said the veterans were exposed to ... depleted uranium, which was used in munitions and armor." It recommended a health survey of 700,000 people who served ... and said "there is no single disease or syndrome apparent, but rather multiple illnesses with overlapping symptoms and causes."

Oct. 5, 1994, *New York Times*, Anna Quindlen:
persistent headaches, rashes, nausea, chronic fatigue and body aches

Dec. 15, 1994, *MLWK JRNL*, Associated Press:
headache and memory loss, fatigue, sleep disorders, and intestinal and respiratory ailments

"Of the 697,000 troops who served ... about 6% — 43,000 — have come forward to either the DOD or the VA and reported ailments they believe related to their service."

March 7, 1995, *MLWK JRNL*, Gannett News Service:
breathing problems, joint and muscle pain persistent headaches, memory loss

April 10, 1995, *MLWK JRNL*, Associated Press:
fatigue, headaches and sleep disturbances

Aug. 15, 1995, *New York Times*, Todd Purdum:
chronic fatigue, memory loss, rashes, respiratory problems, insomnia, gastrointestinal problems, recurrent infections

Jan. 5, 1996, *New York Times*, Philip Hilts:
joint pain, memory loss, fatigue, headache, rash

Aug. 9, 1996, *StarTribune*, Dave Parks, Newhouse News Service:
aching joints, fatigue, memory loss, cancer

Aug. 22, 1996, *New York Times*, Philip Shenon:
chronic gastrointestinal ailments, mysterious rashes and other growths

Nov 12, 1996, *New York Times*, Philip Shenon:
digestive problems, chronic fatigue, rashes, joint aches

Nov 14, 1996, *New York Times*, Gina Kolata:
Asthma, heart disease, fatigue, muscle pain
Dec. 10, 1996, *New York Times*, Philip Shenon:
chronic fatigue, memory loss, sleep disturbances, decrease in sexual drive, chronic digestive problems, joint pain, fatigue

Dec. 11, 1996, *New York Times*, Warren Hoge:
chronic fatigue, asthma, skin disorders, paralysis, reproductive problems, depression

Dec. 12, 1996, *New York Times*, Philip Shenon:
digestive problems, chronic fatigue, abdominal pain, respiratory ailments

Dec. 23, 1996, *St. Paul Pioneer*, Lisa Grace Lednicer:
fatigue, joint aches, short-term memory loss, diarrhea, rashes headaches

July 25, 1997*, New York Times,* Philip Shenon:
"an estimated 98,900 troops were in the path of a plume of nerve gas unleashed when a battalion of
American combat engineers blew up the Kamisiyah ammunition depot in southern Iraq in March 1991, shortly after the war. That is five times the Pentagon's earlier estimate...

The Pentagon at first suggested that only a few hundred American troops might have been exposed to nerve gas as a result of the demolition. The official estimate later grew to 5,000 and then 20,000, and now nearly 100,000.

[*New York Times*, Dec. 5, 1996, Philip Shenon:
"Military logs for an 8-day period in which thousands of American troops might have been exposed to nerve gas and other Iraqi chemical weapons shortly after the Persian "Gulf War in 1991 appear to have been removed or lost and cannot be located despite an exhaustive search, Pentagon officials said today.

"There are several mysterious gaps in the otherwise meticulous combat logs. The gaps include the period in early March 1991 in which American combat engineers blew up the sprawling Kamisiyah ammunition depot in southern Iraq, an event that might have exposed thousands of American troops to nerve gas.

"...some pages must have been lost or destroyed. On the days for which logs exist, there are meticulous, almost minute-by-minute typewritten entries, and it would be remarkable that other on (sic) days, the officers in charge of the logs would simply fail to record any entries at all.

"the explosions on March 4 and March 10, 1991 …

"... the gap in the logs — from March 4 to March 11 — was one of several gaps in the chemical logs.

"The gaps have only added to the suspicion among veterans that the Pentagon is hiding information that would explain their health problems."]

Oct. 9, 1996, *New York Times*, Philip Shenon:
"Defense Department officials said today (Oct. 8) that a review of combat logs that were compiled for Gen. H. Norman Schwarzkopf, the American commander in the gulf war, showed a gap between March 3 and March 12 in 1991."]

Aug. 11, 1997, *New York Times,* Philip Shenon:
Digestive problems, memory loss

"Not only the people in the immediate vicinity (emergency and fire fighting personnel) but also people at distances downwind from the fire are faced with potential over exposure to air borne uranium dust." — *U.S. Army Mobility Equipment, Research & Development Command, March 7, 1979. Via FOIA response to the National Gulf War Resources Center, Washington, DC, September 22, 1997, Chris Kornkven.*

"The radiation dose to critical organs depends upon the amount of time that depleted uranium resides in the organs. When this value is known or estimated, cancer and hereditary risk estimates can be determined." Depleted uranium has the potential to generate "significant medical consequences" if it enters the body. — *U.S. Army Environmental Policy Institute, June 1995 report to Congress.*

"When soldiers inhale or ingest DU dust, they incur a potential increase in cancer risk. The magnitude of that increase can be quantified (in terms of projected days of life lost) if the DU intake is known (or can be estimated) … Expected physiological effects from exposure to DU dust include possible increased risk of cancer (lung or bone) and kidney damage."
— *Col. Robert G. Claypool of the U.S. Army Surgeon General's Office, letter, August 16, 1993.*

In animal studies, embedded DU, unlike most metals, dissolves and spreads throughout the body depositing in organs like the spleen and the brain, and a pregnant female rat will pass DU along to a developing fetus. — *Armed Forces Radiobiology Research Institute (AFRRI) Bethesda, Maryland, as quoted in* The Nation *magazine, May 26, 1997, p.17-18.*

Depleted uranium is a "low level alpha radiation emitter, which is linked to cancer when exposures are internal, [and] chemical toxicity causing kidney damage." The Army's Armaments, Munitions and Chemical Command radiological task group has said that, "long term effects of low doses [of DU] have been implicated in cancer…there is no dose so low that the probability of effect is zero." — *U.S. Army Armaments, Munitions and Chemical Command (AMCCOM), July 1990, as quoted in* The Nation *magazine, May 26, 1997, p.20.*

Depleted uranium: "Increased risk of lung carcinoma and chemical toxicity to kidney. Hazardous decomposition products … Decay products of U-238, U-235, and U-234 are radioactive also."
— *Health Hazards Data, the Materials Safety Data Sheet from the U.S. Department of Labor/OSHA.*

Discussion on Uranium Weapons during the Round Table Conference of the Standing Commission on Defence from the Dutch Parliament

Members of the Commission present:
Mr. Drs. Hans van Baalen (chairman), Krista van Velzen (SP, Socialist Party), Drs. Raymond Knops (CDA, Christian democrats), Mr. Mariko Peters (GroenLinks, Green Left), Drs. Arend-Jan Boekestijn (VVD, liberal party), Hero Brinkman (PVV, Freedom Party)

Guest-speakers:
Prof. Dr. Keith Baverstock, Dr. Avril McDonald, Ing. Henk van der Keur (Laka Foundation), John LaForge (Nukewatch)

Hans van Baalen: I would like to ask the members of the parliament to direct questions to our guests. I will give the floor to Mrs. Van Velzen.

Krista van Velzen: Thanks for all your presentations. It was very interesting. I will start with a couple of questions for Mr. van der Keur. You mention a lot about Kosovo, Bosnia, Iraq. What about Afghanistan, what about Uruzgan where the Dutch soldiers are based. You mention the huge amounts of costs being made for cleaning up the soil. Am I right that the U.S. Air Force has used depleted uranium munitions on the Vliehors, the testing range in the north of the Netherlands? What about the cleanup of that testing range and the costs of that?

Henk van der Keur: Wat betreft Afghanistan kan ik kort zijn. Men kan hier hoogstens spreken over *circumstancial evidence*. Er zijn geen bronnen beschikbaar waaruit naar voren komt dat de Verenigde Staten verarmd uranium gebruikt in Afghanistan. Er doen op internet allerlei wilde verhalen de ronde van activisten dat het in Afghanistan zou zijn gebruikt in *bunker busters*, maar daarvoor bestaat geen enkel bewijs.
Dankzij jou Kamervragen stuurde staatssecretaris van Defensie Van Hoof in voorjaar 2001 een brief hierover naar de Tweede Kamer, waarin er even over werd gerept, maar de informatie is zo schaars dat ik niet bekend is hoeveel er is getest op de Vliehors en op dat andere testterrein op Terschelling dat inmiddels is gesloten. Dus daar heb ik geen inzicht in.

Krista van Velzen: Mr. Baverstock, during your presentation I was asking myself if you could say what evidence we need more to come to any conclusion. You mention that there is a lot of evidence from laboratory investigations. I wonder how many investigations have been done. How can we value this evidence? I saw your presentation in Netwerk, a Dutch TV programme, where you are mentioning that the World Health Organisation has been withdrawing evidence from the Pentagon and not using research that has been done. Can you elaborate a little bit on that?
This parliament has been calling for a moratorium. This was under one of the previous governments. The labour party gained a majority calling out for a moratorium on the use depleted uranium. The trade unions, the spokes person has been ill, have been calling out for a

complete ban. Considering the evidence you just mentioned, do you think that such a call is justified?

Keith Baverstock: The International Organisation responsible for deciding whether any particular agent is a carcinogen or not is the International Agency for Cancer Research (IARC), which is part of the World Health Organisation. They examined depleted uranium a few years ago in terms of what would be the consequences of putting depleted uranium into the body as some kind of surgical implant. They haven't address the issue of this depleted uranium dust. They categorize radioactive compounds in general as a confirmed carcinogen. I am not sure to the extent that that would include depleted uranium. I think they have to re-examine it, but if they re-examine it they would look first of all for human epidemiological evidence, but there isn't any except that arising from Dr. Al-Ali's studies in Basra. Those would have to be validated internationally for the IARC to accept. They would look then to see if there were animal evidence, evidence of cancer being caused by long term exposure to this depleted uranium dust in animals. Now, that is a study that has not really been done. There is one study which is a kind of so we say a short term carcinogenicity test, which is used for commercially available compounds or agents and that would carry weight I think with the radiological authorities, but might not convince the international agency to designate depleted uranium as a confirmed carcinogen. They would then look at the laboratory evidence, the evidence of genotoxicity. Now, that to my mind is very convincing evidence. That was not included in the WHO report. It could has been. The first studies were published in 1998. The WHO published their monograph in 2001. There were two or three publications at that time that they could have drawn upon. But the majority of publications have been reported since 2001. Currently, I think, about 20 peer-reviewed publications are now giving evidence of the genotoxic effects of depleted uranium. So, the majority of that evidence has not been evaluated by the international agency. I could only second guess what they would do but I guess they would put it as a group 2 A carcinogen which means that it is probably carcinogenic and they have two other categories which they could use: they could say that it was a possibility that it is carcinogenic and they could say that it is a confirmed non-carcinogenic. On the evidence and the way they say you can see it for yourself on their website how they decide what is a confirmed carcinogen, that is a very rigorous process and I don't think DU at the moment would meet that criteria. What we need to confirm it as a carcinogen we really do need the human epidemiological evidence, or at least long-term animal studies.
But there is a question here concerning the precautionary principle. In the European Union there is now a chemical toxic agency and I think that DU does not act principally by its radioactivity. I suppose it acts as a chemical toxin and the reason for this is because of these studies that have been carried out by the Pentagon through their Armed Forces Radiobiology Research Institute. Parallel to these studies they did similar studies with nickel. Nickel is a confirmed carcinogen, but it's not radioactive and nickel produced more or less exactly the same effects in the systems in which it was studied. I think there is a chemical toxicity issue here and the European Union has , or will have on the very short term, it's chemical toxicity agency, which will be in Helsinki and I think if an interested government wanted to ask them whether they would advice the use of this DU-oxide as some kind of commercial product , like some kind of cosmetic or something used in food processing , there would be a possibility of human exposure to this material , I suspect that , well in fact I'm pretty confident, that on the basis of the carcinogenic evidence they would not allow its use for that purpose. I hope that answers the questions.

Raymond Knops: Thank you also for your presentations. You made a lot of things very clear to me because I'm not an expert on these issues. A question to Mr. Baverstock: could you tell more in detail in which ways people can be contaminated with depleted uranium? Is it because they touch the material or is it when you are in the vicinity of material which contains DU? Can this cause any illnesses? And a question to Mr. van de Keur. Do you think, from a military perspective, there are perfect alternatives for the use of DU in weapons? That would be very interesting, because if there is an alternative you maybe can abandon DU more easily. Thank you.

Keith Baverstock: My main interest in this topic is public health, not so much the military aspect, but the situation concerning where people , ordinary civilians come to live in contaminated areas . Undoubtedly the most important route of exposure will be inhalation and this will be particularly in dry and arid areas. Therefore, because of that, the problem in Iraq is far more acute then it is in the Balkans and other places where it has been used . Because it is this sparingly soluble component that is the danger and of course if there's heavy rainfall this material is washed into the ground and it's not resuspended. I think that it doesn't present a large public health problem when it will get into groundwater. So it's inhalation of this dry dust and of course in these very arid conditions this dust is constantly being resuspended by vehicles, the wind and all sorts of other adjurations of the ground. Once inhaled the material is dissolved into the lung and gets into the blood, and it effects a number of tissues: the bone, the bone-marrow, the kidney and the liver are the prime-targets. Those are the sites that I would expect cancer arising. The risks of being exposed to DU depends of where it comes from. If it is a result of enriching natural uranium, which hasn't been used for anything else, just dug out of the ground and enriched , then it is solely uranium . It's depleted because it does not have that much uranium-235 as Henk showed you. But there is something which I would prefer to call recovered uranium which goes under the name of depleted uranium , which is enriched uranium which has been through a reactor cycle and then it is recovered and that is contaminated with uranium-236 which doesn't appear in natural material and potentially contaminated by other radioactive nuclides . Now it would be quite safe really to be in reasonably close contact to DU-metal if it were of the first kind, but it may not be because you don't know what the composition of the recovered uranium is and I think we don't know what was used in 1991 in Iraq I don't think that UNEP has had the chance to analyse more than one or two pieces of that ammunition and it was certainly very surprising in 2001 when we learned that this material was used in the Balkans did have uranium-236 which means that it has been at least once through the nuclear cycle. And that raises a lot of questions about whether it was heavily contaminated or not . The reason I suspected it might not have been is that if there had been Cesium-137, a fission product, then it would be difficult to handle , the ammunition, in the manufacture , in the transport of it , because it would be classed as a radioactive material and would not be as easily transported . Is that sufficient to answer your question?

Raymond Knops: One more additional question: Can you elaborate more on the difference between having one contact with DU and having continuously contact?

Keith Baverstock: I think that the military people might be exposed to one perhaps two reasonably acute contacts and the evidence that we have from the German troops and from some 400 UK troops who were examined for DU by the spectroscopic test used by doctor Parrish, did not show excess DU. That's quite interesting. I think it means that in fact this route of exposure for the troops is not so serious. Chronic exposure, however, is likely to be the most

severe. In the United States depleted uranium has been found in former workers at the munitions factory in Colony, New York, and they were exposed over a relatively long period of time every day. One of them with very large quantities of depleted uranium in the lung, hundreds of milligrams. Therefore the civilian population living in the area is the most at risk.

Hans van Baalen: Thank you. Er waren ook vragen aan de heer van der Keur, met name over de alternatieven. Ga uw gang.

Henk van der Keur: Uraniumhoudende munitie is in de jaren vijftig ontwikkeld en werd voor het eerst commercieel geproduceerd in 1974. Dat was dus in de tijd van de Koude Oorlog. Antitankgranaten van verarmd uranium waren bedoeld voor aanvallen op de , destijds, nieuwe Russische T-72 tanks. Die Sovjettanks werden als onoverwinnelijk geacht en bovendien had de Sovjet-Unie, als ik het me goed herinner, een grotere hoeveelheid tanks als het Westen. En je kan zeggen, als je het strikt vanuit militair strategisch oogpunt bekijkt, dat ze nodig waren voor geval er oorlog zou komen. Maar als je de situatie van 1991 in ogenschouw neemt, toen verarmd uranium voor het eerst werd gebruikt in de Golfoorlog, was er sprake van een heel andere militaire verhouding. De T-72 tanks van de Irakezen waren per saldo niet veel meer dan schroot. Er was duidelijk geen militaire noodzaak om verarmd uranium te gebruiken. Met analoge antitankgranaten van verarmd uranium, dan heb ik het over de antitankgranaten van wolfraammakelij, hadden ze ook die tanks kunnen uitschakelen. Er was dus geen militaire noodzaak om die wapens te gebruiken.

Hans van Baalen: De vraag van de heer Knops is ook, zijn er alternatieven die gebruikt kunnen worden.

Henk van der Keur: De wolfraammunitie, ja. Wolfraam is duurder en dat is ook de reden waarom ze toen over zijn gestapt op verarmd uranium want daar hebben ze hele grote voorraden van. En wolfraam moet duur worden geïmporteerd uit China. China is de grootste producent van wolfraam.

Hans van Baalen: Dank u. dan wilde ik naar de heer Brinkman. Mr. Brinkman is member of parliament for the Freedom Party, Mr. Brinkman.

Hero Brinkman: Thank you chairman. I want to thank the experts for their presentations and I am very sorry that I came late, so I missed the presentation of Professor Baverstock. I have a few questions to you and maybe you already mentioned it. I am sorry for that if that's the case. I have a very practical question. I am in contact with a Dutch soldier who is suffering from cancer and who is sure that this is the result of his stay in Iraq. Can research make 100% sure that the cancer of this man is indeed the result of his time in Iraq? And if possible, are there any examples of such studies among soldiers? Another question is, maybe you can answer that, what is the impact of depleted uranium in tank armour on the health of the soldiers who are sitting and working in those tanks for days? Is there a study on this as well? And after answering that question I have another question to, I think, Mr. LaForge.

Keith Baverstock: I am very pessimistic that you could pin down this single cancer to a particular cause. That is largely because of the way cancer actually arises. Mostly, we have not been able to find a mark that a specific agent causes cancer. Asbestos is an exception, because asbestos causes a kind of cancer which no other material we know of causes that kind

of cancer. If you have been exposed to asbestos and you get this particular kind of lung cancer then it is accepted that there is a causal relationship. Another circumstance in which we were able to attribute for example iodine 131 to thyroid cancer in children after the Chernobyl accident was because thyroid cancer in children is so rare, approximately one child per million of the population per year, and when the incidents rate was something like 200 to 300 children with thyroid cancer per million per year we knew that something was causing it and radioactive iodine was about the only thing that it could have been. Those are exceptions, so I am very pessimistic that this particular soldier could find out the origin of that cancer.
You are referring to DU being used as part of the tank armour. When you are in physical contact with uranium metal you will get a dose to the skin. Because you only need very thin material to absorb this, the non-radioactive material shielding covering the uranium metal plate (armour) will stop the very small amount of radiation given off by the depleted uranium armour. So I think that sitting in a tank, the dose rate will be slightly elevated above that in the surrounding area, but not sufficient to be concerned about the health implications.

Hans van Baalen: Mr. Brinkman (PVV) has questions to Mr. LaForge I believe.

Hero Brinkman: Because of this answer, I think we can make a safe difference between the practical use of depleted uranium and the military use. Do you agree with that? Do you think that it is possible, because DU is used because of its weight, because of its costs, it all runs about money in the world of course and because of its hardness. Could you agree with that? Could you say that it is possible to make a safe difference in this?

Hans van Baalen: You mean a legal difference?

Hero Brinkman: Yes, not only a legal difference. If it is used as armour, it is used for protecting people and not for hurting people. So, if Mr. Baverstock says that it is used safely in the armour of a tank, then I understand that the tank crew is quite safe. So I want to ask Mr. LaForge if there is any possibility to use that safely for practical use.

Hans van Baalen: The difference, I believe, between the use to protect for instance in a tank and the use in bullets for instance. If you can make that legal distinction, if you come to the conclusion that it is forbidden or not forbidden.

John LaForge: I understand your question to be wondering if there is a distinction say, in the defensive use of it as armour plate in a tank or an armoured vehicle as opposed to the use of it as a projectile? I believe there probably is a legal distinction although I am not an attorney. However, there remain the same problems as professor Baverstock indicated with the workers in factories that produce this material. The factories that produce the uranium metal for projectiles are the same ones that produce uranium metal for the production of armour plates. The workers are chronically exposed to the uranium oxide dust particles. This internal contamination is the most dangerous.

Hans van Baalen: Mr. Brinkman you could also ask Dr. McDonald whether she sees that distinction from a legal point of view.

Avril McDonald: I can only really speak to a part of the law, of International Law, requires. The principle that I mentioned prohibited superfluous injury or unnecessary suffering to

combatants, it only applies to enemies combatants. So that would not offer any protection to your own troops. I mean the only protection would be that arising under International Labour Law or something like the Human Rights Law for instance. But the problem is of course that once you join the military you have a different legal regime, you operate in a different legal regime than you do as a civilian and you give up some of your rights. Than it is like occupational part of the problem of the job. But of course the persons, your own soldiers who are in a tank that is covered in DU, the DU can escape when it is struck by an non-DU tipped missile. They could still be exposed, but then they would be covered in a sense that the responsibility would go to the other side. They would have the responsibility at that point, not your own side. So there is nothing in fact and that is the problem, there is nothing in International Law to protect your own troops in the Law of Armed Conflict. It really comes down to the states, it is really a question of their own self-interest in terms of protecting their own troops after the conflict, in things like clean-up because of the costs that have been mentioned.

Hans van Baalen: I would like to turn to the Green Left Party, Ms. Mariko Peters please.

Mariko Peters: Thank you very much and also from my side many thanks for your presentations. I have a few questions, first of all perhaps to Ms. McDonald, the legal aspects. Forgive me for asking this but could you give a short summary of what you have representing us. What is your conclusion: it is not illegal but it may be a violation of those principles. Is that how I have to understand you correctly?
And my second question to you would be: what do you think that, how do you assess the effect of a ban on the use of depleted uranium weapons such as Belgium imposed and do you recommend a ban or moratorium to be an effective instrument to discourage the use of depleted uranium if it is done by a country which does not use depleted uranium itself, but does sometimes send soldiers to regions where it maybe has been used by others.
My last question to you would be: in one of these presentations we were shown limits put by certain governments or the WHO of safe inhalation of depleted uranium, if I have understood the presentation correctly. What does that mean in a legal way? Does that mean that any inhalation above that limit would be illegal? Or not?

Avril McDonald: I will not repeat what I said but I just wanted to make it clear in my presentation that in International Law, and in law generally, Arms Control Law basically bans certain use of weapons or limits their use, like the Chemical Weapons Convention, and then there is no question of using the weapon at all, usually, if it is banned, I mean that is it, that is the end of that. If there is not an explicit ban, which there is not in relation to DU. If it is out there, we could not find it and we looked pretty hard I can tell you. The only thing that the Law of Armed Conflict does, is it restricts the use of certain weapons. It generally does not ban the use of any weapon outright, with certain exceptions such as poisoned weapons, you mentioned. You might wonder, why could we not find that DU was a poisoned weapon given the fact that it is a toxic weapon. I have to say I disagree with your analysis because we found that it could not be a poisoned weapon because it is a very technical legal description. It refers to, in a way, what is the weapon designed to achieve. It does not really address the effects of the weapon. You could say that DU has poisonous effects, that is indeed true, but it is not designed to be used as a poisonous weapon. Those are incidental, secondary, unfortunate side-effects of the use of the weapon. The ban of poisonous weapons in International Law only addresses weapons that are designed to be used as poisonous weapons. Such as for instance something

like a chemical weapon would be in a way a poisonous or toxic weapon. So that is why we could not decide, that we could not conclude that DU was a poisoned weapon, because it is not used with the intention of poisoning people, it is used with the intention of hitting and destroying the tanks. So we said that there were certain, there are certain rules in International Law, in the Law of Armed Conflicts specifically that would limit the use of depleted uranium, could limit of depleted uranium in certain cases. The reason why we are hatching a little bit is because of the fact that Humanitarian Law is only concerned with foreseeable effects. You only have to prevent the effects that you can foresee otherwise you could not possibly be able to prevent them. And that is what the problem really with depleted uranium is, is that not all the effects are foreseeable. The commanders, when they are carrying out the military operations, all that they can take into account is: what do we know actually about these weapons? That is why we have to be quite specific. There could be certain cases where DU could be used in a completely lawful way. Where there will be no risk, miles away from civilian populations, where there will be no risk of anyone, any civilians, let's say, being contaminated. That is a very different scenario and Mr. van der Keur mentioned something which is very important to the analysis of DU's legality and that is the military necessity of the use of the weapon. This weapon was designed to be used against the best armour in the world, Soviet tanks out of the plains of Europe. Not against soft targets like buildings, against personnel, in a built up heavily urbanized environment. I would say, the military necessity there is different. It is a relative thing, it is a balance. It is different than it would be in a completely different context. And where you know that there, as in Baghdad, was footage of buildings as some of the Ministry buildings, it was used besides market places, and they used Geiger counters to show what was the level of radiation after this strifing and they discovered that it was up to 1400 times greater. So in that case you could say that is a factually different scenario than when you are using it, especially if you are using it against a decrepit kind of, you know, not a very good tank maybe. There is a difference when you use it against a particular type of tank, for instance a tank that actually is coated with depleted uranium. The military necessity is greater in that case. But we said in the end that there were only a few cases were the military necessity, we felt would be such that it would be not problematic at all to use it. And there could be cases where the humanitarian considerations are different and the military necessity would be less. And that for instance would be in an urbanized area. So we recommended that its use would be restricted in such situations, in situations where civilians would have relatively higher risk of exposure.

Hans van Baalen: Mr. Brinkman would like to intervene please.

Hero Brinkman: Dr. McDonald you said something very amazing I must say. I will give an example to make clear what I mean. Suppose I am a soldier and I have to kill someone. I shoot the guy with a bullet and he is dead. Okay, than I killed him. But if I shoot him with a 50mm grenade and because of that big thing ten people are dead, I killed ten people. I heard you saying that if you use bullets with DU and it is a sort of side-effect that other people can be killed as well. That of course is still the purpose of that weapon, you cannot say, oh it is just a side-effect and it is not because of the use of that kind of bullets.

Avril McDonald: You are mixing up two different parts of International Law. Basically a poisoned weapon is a very clear, a very technical definition. What you are talking about is actually collateral damage, proportionality during an arms attack. How many civilians are going to get killed. A poisoned weapon, it is not a question of just the weapon's poisonous effects, that is not what a poisoned weapon is. It is a weapon that is designed to kill you by poisoning

you. That is what a poisoned weapon is. DU is not designed to be used as a poisoned weapon and it is not used as a poisonous weapon. That is what the law demands, I am not making that up. That is the requirement of what the law says. I mean I would like to be able to tell you that it is a poisoned weapon but we would have to look at the misinterpreted provision to be able to do that. But of course when you use a weapon that does have, as I said, some expected effects, some unexpected effects, which are very difficult to causally link, you would than use the proportionality principle in International Humanitarian Law to say we think that there would be a potentially disproportionate, unfortunate effect, result of the use of the weapon. The proportionality, the consideration would be relatively greater, but it has nothing to do with the poisoned principle.

Hans van Baalen: I think we turn to Ms. Peters questions, maybe there are some left and otherwise Ms. Peters will ask a follow-up.

Avril McDonald: You asked me about a ban. I really do not care frankly if depleted uranium is banned or if there is a moratorium in its use. It has the same effect. My main concern is that these weapons would not be used in situations where deaths arise as to its effects. We cannot be a 100% sure at this point. I think it will be politically easier to get a moratorium, obviously. There is no political momentum at the moment towards a ban. This is not really on the political agenda. The only two user states, well the two main user states, the United Kingdom and the United States are not going to sign up to a Treaty Ban on depleted uranium. So unless they are on board, it is really quite pointless, because they are the predominant user states. Belgium banning depleted uranium to use on its territory is just a political gesture. It has no real practical effect on the problem. I would say though that, you know, again if you appeal to states self-interest, which is how we have proceeded. We think, what do we want, we want the military to stop using depleted uranium in certain cases where we think it is problematic. How are we going to do that. Not by telling them it is already banned, because than there is no need, but by trying to persuade them that it is in their interests. That is what our approach has been. And we are saying, do this, because it is a smart thing to do. Partly it is legally required, but we are not going to tell you something like the precautionary principle requires it because we do not think there is any legal basis for that. But we do think that it is in your interest to take these measures to avoid potentially breaking a rule. But if there was a moratorium on using it, you have to understand as well that we also, as far as the prohibition on superfluous injury or unnecessary suffering is concerned, we also made a distinction, and you have to distinguish how DU is used, it is very different using DU to hit a tank, okay there will be soldiers inside that tank who will be killed probably. That is very different than using DU directly against combatants. And partly why depleted uranium is used for instance against, they would say, the military would say, against a combatant in downtown Baghdad. Why did they use DU against him. It would be much more effective to use a different weapon. The reason they say is when they load the weapons on the planes, this is a military necessity argument, you are flying along and your mission is to take out some tanks, but hey, on the way you run into some soldiers and you take them out. It is target of opportunity. That is a legally different situation than when by firing depleted uranium at a soldier from a tank. So we made this distinction between anti-personnel and anti-material use. It is recommended against material, against hard military targets. But we said that there would be really no legal justification based on the application of the principles prohibiting superfluous injury or unnecessary suffering to your enemy combatants to tank fire DU directly against personnel. We could find no legal justification at all. Because there is no question of a target of opportunity situation. We are saying to the states, we want

to have a practical approach where we try to persuade the actual user states, so not Belgium, I do not care about Belgium, you know, I care about the United States military, so that is who I want to stop.

Hans van Baalen: You are very clear. Ms van Velzen has an intervention I believe.

Krista van Velzen: On the Belgian ban. At first I was surprised because I know Belgium does not have DU nor does it use DU. But then again, there are American bases in Belgium, there might be air force personnel, plus as I have seen over the last two mayor wars in Iraq and Afghanistan, there has been a lot of transport of weaponry and ammunition over both rail tracks and through the harbour which includes our waters. I am not sure why there has been such a tremendous support for this ban, although I am happy with it. Don't you think that there is a connection with the transportation of all this ammunition?

Avril McDonald: It may very well do. I mean, it will certainly inconvenience, a ban would inconvenience, could inconvenience some foreign troops. And I am not opposed to a ban obviously. A ban would be the ultimate result. I just think, what are we going to put our energy into here. I think the significance of the ban is political, not legal. I mean, because it creates, hey Belgium is signing up for a ban, you know: great! It creates political momentum which is good. But I think, what we want to do are really persuade, and it is not only of course the user states, it is also, we want to persuade other states from acquiring this weapons. We want to address proliferation of the weapon. And that is potentially an issue because there are more states acquiring it and by the way, non-state actors. There was some evidence that DU had been found with Al-Qaeda. So it is not impossible that that weapon could get in the hands of non-state actors, which is something that is hardly been discussed at all, in fact. I would like to see that the ban and the galvanization of a political momentum is good in order to create a sort of a moral awareness of the risks and to build a consensus.

Hans van Baalen: Thank you. Ms. Peters has maybe also other questions.

Mariko Peters: I had one more question on this dust limitations that were shown to us meant, if you inhale more than zero-point-blabla percent, than it is dangerous or not dangerous, and what does that mean in a legal sense.

Avril McDonald: Something is either illegal or it is not illegal. It does not become more with something like that. Obviously the significance of that is, if you could say, for my argument, if in this particular situation, we can show that this level of exposure, this use of DU will have this level of exposure, it gives more weight to my argument to say: in that case there could be a potential violation of the principle of distinction. But it is a sliding scale, I mean, there is not a threshold that we would say: we crossed that threshold. Everything is relative. Because the argument you are going to be making is that the weapon is being used in an indiscriminate way or potentially in a disproportionate way, it has disproportionate effects. So the worst the effects, the more disproportionate they could potentially be.

Hans van Baalen: Ms. Peters has other questions for other experts.

Mariko Peters: I have a few questions for Dr. Baverstock. Much talk has been, both in our media and I believe in your presentation about missing evidence and the need for more

evidence. Now, about the only evidence that is available, I understand, is Dr. Al-Ali's evidence, who is not here. What does his evidence actually prove? Talk, also in the media, was of this mysterious Dr. Alexandra Miller working for the Pentagon. What does her research prove? And what is the link we have been shown in many photographs with children with birth defects. Is there a link or is there a likelihood that it is linked to DU?

Keith Baverstock: The missing evidence is really to have some epidemiological evidence from an exposed population. That would actually solve the whole issue. We would be able to say if we found that evidence that, yes, uranium is a carcinogen. Without this evidence it is a kind of technical thing. As somebody who advices on public health issues I would say it is a carcinogen; I would treat it as a carcinogen for my own self, but it is not excepted by the international community.
Perhaps I just may remark about those limits. There is no safe limit. We are dealing with chemicals which are carcinogenic, usually there is no threshold. Usually, we set a limit of an acceptable risk. And those limits that were referred to by the WHO and various other organizations were for insoluble uranium compounds and they concerned the effects of radiation on the lung. And to say that a certain amount was safe is not really correct. There are risks to everything, and there is an acceptable level of risk which one assumes that society would accept. These levels are set, they do not have any legal weight unless a country decides to set those as a limit and then control the risk that way.
Now, Dr. Al-Ali's evidence. Dr. Al-Ali has seen a dramatic increase in cancers and in birth defects in his hospital and in other hospitals in Basra. The problem here is to attribute it to depleted uranium is somewhat controversial because during the Iraq conflict in 1991, there were releases of several other agents, which possibly are carcinogenic. The residue from explosives, nerve gas was released, there were oil well fires, there were various factories and industries which were bombed and caught fire. I would advise you never to stay around an area where there is a fire, no matter where it is, because what comes off burning plastic and the contents of the building are quite likely to be carcinogenic. The difficulty with the evidence from Iraq is that we do not know, we cannot specifically indentify what has caused it.
Dr. Miller. Dr. Miller is a research scientist, working for the Armed Forces Radiobiology Research Institute, which is part of the Department of Defense or the military establishment in the United States. The United States is forced to look at the issue of uranium toxicity because it has a number of soldiers with depleted uranium fragments in their bodies and therefore they are being exposed and it is impossible to remove these fragments surgically because they are so small. They have a duty to determine what the health consequences of this material is, and in fact it is down to Dr. Miller's work that we know, primarily that we know that depleted uranium is genotoxic. She has done all the experiments at AFRRI and the results have been published. Her objective was not to discover the effects of this dust that is produced but to know how this uranium is effecting American citizens who happen to be unfortunate enough to have it in them. Actually it is quite interesting there is no better source if you like for the evidence for genotoxicity than actually the people who are using this material most frequently: the US military. But as I say, it is a catch 22 situation for them, I am sure that they would not like to do it if it was to discover whether the dust was genotoxic. But the question is: does the dust lead to uranium in the body, and then, can we draw a distinction between uranium being in the body having derived from the dust and uranium being in the body having derived from the fragments. And I think we cannot. So, it is systemic uranium which is genotoxic, probably because of its chemical properties as I said.

The birth defects, it is connected with the same sort of thing. If you are contaminated, particularly as a father, than there is a possibility that there will be defective births as a result of that.

Krista van Velzen: I have a very last question, because a lot of questions have been answered already. The case of the Italian soldiers, I do not know if anyone of you knows more details, but as far as I know there is a parliamentary investigation happening right now. We received the news that they need more time to investigate depleted uranium and its effects on military personnel. I was wondering if you know why they need more time. And why they have chosen to give money as reimbursement for health effects to military people, while there is still an investigation going on.

Hans van Baalen: At least the deputy minister of defence has send a letter in which he said that as soon as the results of the parliamentary committee of the Italian parliament are there it will be given to our committee, so we will be informed anyhow.
Then we come to the conclusion of this round table. I thank first of all Ms. van Velzen for taking the initiative and I thank all the participants for being here, giving us their knowledge and wisdom on this matter and I am sure that parliament will use this information on dealing with the matter. So I thank you very, very much. We have had your presentations and mailed them to the committee. I believe that also Dr. Al-Ali's presentation is in it, but it will anyhow being forwarded to the members of the committee, and the movie will be also given to the members of the committee. But I see a question or a remark.

John LaForge: Thank you Mr. chairman. I just wanted to alert the chairman and the committee to the fact that I have brought with me for the committee a copy of the US Air Force's journal or standing law, international law of a conduct of armed conflict in air operations which defines poison very specifically. And which was the basis upon which the juries in the United States agreed with defendants that depleted uranium does constitute a poison since its effects are unnecessarily, unavoidably and inevitably poisonous to the people in the area where it is used. That it can therefore be considered a poison, and I think the definitions provided by the US Air Force are important because in fact as Henk has pointed out, it was the US Air Force that has been, that is the primarily the number one user of the devices.

Avril McDonald: The United States is the only state in the world that has done a legal review of depleted uranium. The United States Army and Air Force had both carried out legal reviews and they have both looked at it as poisoned weapon potentially and have both concluded: it is not a poisoned weapon, specifically, legal reviews on depleted uranium. I have not read your journal, but I can tell you that the United States, in its 1975 and '96 reviews, does not believe DU to be a poisoned weapon. It specifically excluded that possibility.

Hans van Baalen: Thank you for your comment. We will read the information you have given or will give to the committee. Thank you very much again.

Discussion on Uranium Weapons in Amersfoort

Carolien van der Stadt (WILPF): Many years ago I had a speak-in with Minister of Defence Frank de Grave and they never seem to know when DU will be used. He said 'well it overcomes you' . The problem is we are part of NATO who decides, or in other words the US. This causes the first problem, the first 3-4 years are spent with 'no it wasn't used, maybe it was used, we used something else' etc. In the mean time people suffer from all those effects. Most important of all we, or at least the Ministry should know when/if depleted uranium is used beforehand.

Krista van Velzen: We're in the middle of an ongoing official debate about cluster munitions. There's a parallel whether it has been used during the war on the Balkan. Only now NATO is giving information about the targets. How can you clean up when you have no awareness if it has being used. Cluster munitions is quite visible but with DU, an aerosol, this is quite difficult. In fact NATO seems a big institution with a lot of power but in fact it consists of our Ministers of Defence talking on behalf of us. We have to put more pressure on our governments that if these type of weapons are being used there should be more transparency to make sure that we have no environmental impact and there are less casualties. This is a compromise of course because it shouldn't be used at all, but when it's been used these people should take responsibilities and that's not happening right now.

Els de Groen (European MP): There is a certain pattern in the attitude of the Commission and the Council. They always say 'you should turn to the national authorities', but the problem is that the national authorities don't have the knowledge about DU being used or not, and where and how much. Euromil is asking the same, because they don't have the information either. You're send from one desk to another. When I asked the government directly, they told me they said 'no' to this General Assembly resolution because of its wording: 'possible and potential danger' because 'potential' would mean there is a danger and 'possible' we don't know. This is a 'non-answer'. A fork is something to eat with, but if I take that fork to Schiphol airport on a flight to New York, all of a sudden this fork it's a weapon. So we simple have to have a good legislation for dangerous weapons in order to ban them.

Bob Booms: Ik heb zelf aan verschillende missies meegedaan. Ik heb gemerkt dat als je een ongeluk overkomt dan moet je zelf via de VN het land waar je het hebt opgelopen aansprakelijk stellen. Als ik die twee collega's op Netwerk zo hoorde, dinsdagavond, die een dump van wapenafval bewaakten, dan is het voor mij als leek zo helder als wat dat die jongens hebben blootgestaan aan straling. En dat je dan moet vechten tot aan je laatste dag voor je recht en dat je nooit meer van het leven kan genieten. Wij komen gehavend thuis, hebben ons land gediend en worden vergeten. Alleen op 29 juni, Veteranendag, staan ze te klappen in Den Haag, maar voor de rest zijn we vergeten. Ik heb deze keer meegedaan met de alternatieve veteranendag en geprotesteerd tegen de oorlog in Afghanistan, in mijn veteranenpak. Wat je daarna over je heen krijgt als gewoon soldaat wil je niet weten. Ik zou wel veel meer informatie willen geven aan politici als Krista, maar je begint gewoon bang te worden want je hebt zwijgplicht. Dat gaat soms zover dat mensen in psychiatrische inrichtingen terecht komen om ze het zwijgen op te leggen. Ik hoop dat u als deskundigen het voor ons (oud-)militairen op wilt nemen om dit tot op de bodem uit te zoeken.

Krista van Velzen: Ik vind het heel moedig als ook mensen binnen defensie hun mond open durven doen. Ook mag je niet overal spreken maar het gaat jou en je collega's aan dan moet je op een bepaald ogenblik wel gaan spreken. Ik was ook blij verrast dat de AFMP hier vanavond wilde spreken en oproept tot een verbod op DU. Zij zijn al langere tijd in gesprek met mensen die lijden aan ziekten die heel goed gerelateerd zouden kunnen zijn aan DU. Dat zijn militairen die nog in dienst zijn, die spreken daar niet gauw over in het publiek totdat één van die jongens zijn verhaal in het AD neerzette. Dat helpt ontzettend om de discussie te voeren op het moment dat het probleem een gezicht heeft, dat je weet dat het om jongens gaat van 26- 27 jaar die er aan kapot gaan.

Bob Booms: Zelfs een jongen van 20 jaar. En het is niet alleen de soldaat. Ik ben mijn vrouw en mijn kind kwijtgeraakt. Je raakt alles kwijt, nu ben ik 60 en dan zeggen ze je moet er mee leren leven, nou je kunt er nooit mee leren leven. Elke nacht heb ik nog steeds bezoek van kinderen uit die oorlogen, het gaat gewoon niet van je netvlies af, plus de spijt die je hebt dat je mee hebt gedaan aan geweld. Ik ben nu eenmaal maar voor één ding opgeleid en dat is militair zijn, voor de rest kon ik helaas niks. Ik word erop aangekeken dat ik geprotesteerd heb op veteranendag, maar ik hou van mijn vaderland laat dat duidelijk zijn. Wij bestrijden elkaar als veteranen ook niet, ik wil het voor die jongens opnemen, dat als je uitgezonden wordt en je komt zonder benen thuis dat je fatsoenlijk verzekerd bent en je kind zijn studie af kan maken. Op de Leusderhei wonen nu twee jongens omdat ze daar de hele dag geschiet horen en dan voelen ze zich 'thuis', ik breng ze elke dag eten. Hier wonen dus ook verscholen veteranen in de bossen, net als in Amerika, volledig buiten de maatschappij.

Question: What about the groundwater, isn't that a big problem?

Keith Baverstock: The situation in Kosovo was most air to tank ammunition. A lot of it was fired, but only a few bullets got into the tanks. Most of it goes into the ground and it doesn’t burn, so it sits there as the metal and it corrodes, given the natural amount of uranium that is already in the ground that isn't going to increase over the country as a whole. That's not going to be a public health problem. In Finland for example in some places drinking water is consumed that contains 50 times the normal level of uranium, but people don't get sick. I think you can take relatively large amounts of uranium in drinking water over the natural level without getting sick.

Stan van Houcke (journalist): But what about Iraq? I was in a hospital in Baghdad in 1995 and met a lot of sick children with leukaemia or other forms of cancer.

Keith Baverstock: Don't get me wrong I think that the biggest problem with DU is in Iraq because of the very dry atmosphere, but it's not in drinking water, the primary problem is inhalation. That is a far more effective way of getting the DU into the blood. And it has to get into the blood to cause leukaemia. It's first of all an inhalation problem, not an ingestion problem. If you inhale it there nothing that's going to stop it getting into the blood.
So inhalation is far worse and I think children living in those dry areas polluted with DU dust are exposed to it day in day out and that is the real problem.

Stan van Houcke: I have a question for Avril. You stated that it's not a biological or chemical weapon. As long as the experts don't know exactly what we are talking about, how can you be so sure that none of the international laws can be used for this particular weapon?

Avril McDonald: Well we saw through the fork-example that everything can be weaponised. First of all we had to find about what the stuff is we're dealing with. I did not conclude that there is no law dealing with DU, I said that there were two parts of the law on armed conflict that could be relevant. I think people focus too much on what is not known about DU then to what actually is known. We know something about the effects. We are not totally shooting in the dark. And we know these effects could be serious. We just don't know everything that's the point. So what we are trying to do with our precautionary approach is to account for the foreseeable effects of a weapon. When you are in a tank and this gets hit by a DU shell and you survive we know this is a high risk situation and that you could get sick. These are known or foreseeable effects. The problem is the effects don't show immediately, you have to wait a while, that is what makes it difficult to prove their negative effects.

Stan van Houcke: But a government which uses a weapon which they don't know exactly what it causes, you could go to the civil court and say listen you use weapons of which you didn't know exactly what the effects would be. So you are liable for the fact that I have cancer or whatever kind of sickness that was created by a weapon you didn't know what the effects would be.

Avril McDonald: It's not as clear-cut as that in a sense, there's always the unknowable in armed conflict situations. You do know certain effects and that are the only effects you have to take into account. Not the effects you don't know or can't know. That are the parameters you are operating within a sense. More research will make the case stronger. A state is not allowed to ignore the outcome if you can conclude it's a harmful weapon otherwise this state would be violating the law.

Question: Why doesn't the government like a research on DU , why did they try to block the discussion in parliament?

Els de Groen: Because they don't want to know anything about victims or pollution. This is the very reason: money, money, money. And if you have to pay the victims you are losing money.

Krista van Velzen: I start with the question, why is the Netherlands not doing any research. The phrase of the UN-resolution was 'DU is potential harmful' and that's not where our government is yet. That's why they voted against this resolution. So we tried to change these phrase 'potential harmful' into 'possible harmful'. However our next chance voting in favour of the resolution is in a year and I'm not that patient.

Question: We have heard of these aerosols. Is there a chance to get them into our country?

Keith Baverstock: Well no, I don't think it travels those distances from Iraq or the Balkan to our country. The initial fall-out is pretty local, it falls in about half a kilometre. In dry circumstances like Iraq it in time can spread over about tens of kilometres but not hundreds or thousands. It's not a Chernobyl thing.

Verbied Militair Gebruik van DU en draai de Bewijslast van de Gezondheidsklachten om

Door Krista van Velzen, Socialistische Partij

Ik zit in de vaste Kamercommissie voor defensie. We hebben vanochtend een parlementaire hoorzitting gehad waar mijn collega's in de Tweede Kamer nu ook eens gehoord hebben van de deskundigen waar het nu eigenlijk over gaat als we het over *Depleted Uranium* hebben.
De start van de discussie in Nederland moet volgens mij zijn: wat weten we hier eigenlijk over? Waarom wordt er militair materieel ingezet waarvan we amper weten wat de effecten zijn? Zelf ben ik jaren geleden wakker geschud toen mensen naar mij toe kwamen met folders en foto's over de situatie in Irak. Mensen die gruwelijk mismaakte kinderen kregen. Je vraagt je dan af: klopt dit? Waarom zijn dit zulke heftige foto's en waarom hoor je daar nooit wat over in de media? In al het speurwerk wat ik sindsdien heb gedaan, zonder dat ik mezelf een deskundige wil noemen, moet ik stellen dat mijn twijfel, mijn schrik nooit weggenomen is. In tegendeel hoe meer ik er van te weten kom hoe meer ik denk, waarom gebruiken we dat soort materieel.

Nederland heeft verarmd uranium gehad, de Koninklijke Luchtmacht heeft er mee getest op de Vliehors, het militaire oefenterrein op Vlieland. Daar is ook besmetting geweest, dat is hoogstwaarschijnlijk niet opgeruimd, de getallen die ik nu hoor wat het kost om het op te ruimen doen mij vermoeden dat het ook nooit opgeruimd zal worden.
Wat mij ook opviel was het gebrek aan politieke aandacht. Als je kijkt hoe vaak het onderwerp verarmd uranium aan de orde is geweest dan is dat eigenlijk bedroevend weinig. 80% van die aandacht komt dan ook nog eens van mij en dat is geen goed teken. Ik was ook heel verrast over de commotie die ontstond over iets wat er gebeurde in de Verenigde Naties. Daar kwam de Algemene Vergadering bij elkaar en er was een groep landen die voorstelde om eens een inventarisatie te gaan maken van alle onderzoeken die bekend zijn naar de effecten op de menselijke gezondheid van verarmd uranium. Dus eigenlijk heel vriendelijk: laten we eens kijken wat er aan papieren rondwaart en het bij elkaar leggen dan hebben we het er volgend jaar weer over. Tot mijn verbazing stemde Nederland tegen die resolutie. In feite wil je dan niet dat er bewijslast bij elkaar gelegd wordt. Dat vind ik een onwetenschappelijke houding en ook politiek niet te verantwoorden. Ik heb het kabinet meteen om verantwoording gevraagd. Pas toen kwamen er ook verontrustende reacties van CDA en PvdA. Let wel er is wel degelijk politieke aandacht geweest ten tijde van de oorlogen in Kosovo, Bosnië en Irak. Tijdens één van de paarse kabinetten is er zelfs een motie aangenomen in de Tweede Kamer die opriep tot een moratorium en die motie kwam van de PvdA, alleen was toen het argument van de regering: "Maar er is geen draagvlak om een moratorium in te stellen binnen de VN en de NAVO, en we hebben het zelf nu ook niet." Ik denk dan altijd als er geen draagvlak is, dan moeten we voor draagvlak zorgen. Mijn collega's in België zorgden al snel dat daar de discussie gevoerd werd en dat er een absolute meerderheid opstond die zei, we gaan niet eens aan een moratorium beginnen, we stellen meteen een verbod in. Die wet treedt binnenkort in werking en daarmee bouw je het momentum op. Dat was ook mijn gedachte toen ik Avrils betoog hoorde. Er zijn heel veel wetten die het niet mogelijk maken om verarmd uranium te verbieden, maar de wet die maken wij. Ik maak de wet als Kamerlid, u maakt de wet als kiezer. Als de wet ons niet helpt dan moeten we de wet aan gaan passen. Internationaal recht is niet statisch. Tussen droom en daad staan wetten en praktische bezwaren maar het valt allemaal op te lossen. Volgens mij is dat waar we hier nu mee bezig zijn.

In Italië is momenteel een parlementair onderzoek gaande. Veel militairen zijn daar overleden of werden ernstig, waaronder veel kankergevallen. Er ontstond ernstige twijfel of dat statistisch viel te verantwoorden. Het ministerie van Defensie heeft daar besloten de mensen een schadevergoeding te geven. Dat is een belangrijke stap voorwaarts. Het werd al eerder gezegd, maar schadeclaims is natuurlijk iets dat als een zwaard van Damocles boven deze hele discussie hangt. Wie weet wat er gaande is en wie heeft daar niet naar gehandeld. Wie heeft de verantwoordelijkheid voor eventuele slachtoffers als keihard blijkt dat er een link is tussen verarmd uranium en de slachtoffers die nu vallen. Er moet meer onderzoek komen. Maar dat komt er niet spontaan. Onderzoek kost geld, er werd daarnet al over gesproken. Dr. Al-Ali, die door visumproblemen niet kon komen, heeft ook financiële problemen. Het is natuurlijk te gek voor woorden dat we miljarden steken in onze Defensie-industrie en het voeren van oorlogen maar dat de effecten daarvan, dat we daar eigenlijk amper geld voor over hebben. Nederland is inmiddels zo ver dat onderzoek gedaan wordt naar de situatie in de Balkan. Het RIVM is een onderzoek aan het uitvoeren. Daar komen ze volgend jaar mee, maar wat de reikwijdte van dat onderzoek is, is mij onduidelijk en zeker de politieke implicatie daarvan. Je kunt immers onderzoeken totdat je een ons weegt maar je moet open staan voor de optie dat we misschien moeten stoppen met het gebruik van dit wapen en dat we ook moeten stoppen met deelname aan missies waar anderen het wapen gebruiken. Nederland heeft deelgenomen aan de missie in Irak. Daar hebben Nederlandse militairen een blootstelling gehad aan verarmd uranium en tot mijn verbazing, toen ik daar naar vroeg, werd gesteld dat die blootstelling er wel was geweest maar dat daar geen negatieve effecten op de gezondheid van verwacht kon worden, terwijl we tegelijkertijd zien dat er te weinig onderzoek is gedaan en dat dat voor de Nederlandse regering geen reden is om nadere stappen te nemen. En dus komt er geen moratorium, er komt geen verbod, want er is geen onderzoek dat keihard bewijst dat er iets mis is met verarmd uranium. Dat zijn niet mijn woorden, want volgens mij is er bewijslast genoeg, maar tegelijkertijd zien we het gebrek aan bewijs ook als een reden om verder niet tot handelen over te gaan. Er wordt dus ook te weinig gezondheidsonderzoek op militairen toegepast. De uitzending van Netwerk van afgelopen dinsdag bijvoorbeeld, daar was een schrijnend verhaal van twee slachtoffers van mogelijkerwijs verarmd uranium waarbij één militair al overleden is en waarvan de moeder aangaf dat er eigenlijk amper onderzoek plaats had gevonden en dat zij zich in de kou voelt staan. Het is natuurlijk schrijnend als wij mensen naar verre landen sturen om daar oorlogen te beslechten, dan moeten we ook voor die mensen zorgen. Los of je voor dat wapen bent en los van of je voor die oorlog bent, hebben wij de zorg voor die mensen te nemen. Een tweede geval wat daar aan de orde kwam was een jongen die binnen korte tijd 55 tumoren heeft ontwikkelt en waar Defensie niet de verantwoordelijkheid voor neemt. Hoeveel bewijslast heb je nodig tot het ministerie van defensie zegt, ja dat zou wel eens kunnen liggen aan de werkzaamheden die jij uitgeoefend hebt. Ik vind het eigenlijk een principepunt dat als jij voor het leger werkt, dan wordt je goedgekeurd, psychisch, medisch, dat is een onderdeel van je sollicitatieprocedure. Als je op het moment daarna ziektes ontwikkelt, medische klachten, psychische klachten die mogelijkerwijs gerelateerd kunnen zijn aan je uitzending, dat defensie daar per definitie gewoon verantwoordelijkheid voor moet nemen. Tenzij het overduidelijk is dat je bent gaan skiën en daar een been hebt gebroken. Op het moment dat het niet duidelijk is zou ik vinden dat je de bewijslast om moet draaien.

Ik rond af, de hoorzitting in de Tweede Kamer, ik heb daar steun van de PvdA voor gekregen, dat was heel prettig, maar ik kan je verzekeren dat we ons de blaren op de tong hebben gelobbyd om de VVD en het CDA zo ver te krijgen dat ze deze hoorzitting tolereerden. Waar ik erg blij om ben was dat de woordvoerder van het CDA, Raymond Knops, die zelf militair is

geweest, aangaf dat hij toch wel geraakt was door de verhalen van de deskundigen omdat hij zelf gediend heeft in Basra. Basra is de stad waar Dr. Al-Ali zijn onderzoek heeft gedaan , en toch begon na te denken van, hé dat gaat eigenlijk ook wel over mij en ook wel collega-militairen kende die wel met hele rare symptomen, rare ziekten rondliepen.
Dus al met al wat mij betreft moet het gebruik van verarmd uranium verboden worden. In de tussentijd is een moratorium een goed idee en het lijkt mij voor iedereen noodzakelijk om meer onderzoek te doen en om al het onderzoek bij elkaar te brengen en ik denk dat we de druk op de Nederlandse regering moeten opvoeren om bij de volgende vergadering van de VN aan de juiste kant van de streep te gaan staan.